Change Undergraduate Course

Change a Course

Subject: MSE-Materials Sci and Eng
Number: 3420
Effective Term: Fall 2018
Title: Struct/Property
Honors Course:
☐ Add Honors Course:
Last Term Course was taught: 201601
Brief Statement of Change Based on Assessment Results:
Evolution of field and better alignment of student learning outcomes throughout curriculum.

Rationale for Changing a Course

- ☐ Strengthen Program Requirement(s)
- ☐ Alignment of Student Learning Outcomes
- ☐ Alternative Delivery of Content
- ☐ Improve Time to Degree
- ☑ Evolution of the Discipline
- ☐ Changing Prerequisites
- ☐ Address DWF Rates
- ☐ General Education Modifications
- ☐ Other (Please specify.)

☑ Change Catalog Description

From Provides a basic understanding of how microstructure interrelationships and processes affect the physical properties of materials and how environmental effects modify structure and mechanical behavior of materials.

To Materials processing, microstructure and properties related laboratory experiments to provide a basic understanding of the interrelationships between processing, microstructure and properties of materials.

Learning Objectives

Students will be able to:

- demonstrate how to safely work within a materials science laboratory.
- apply the appropriate methods to process selected ceramics, metals and polymers.
- apply the appropriate characterization methods for metallic microstructures.
- apply the appropriate characterization methods for ceramic microstructures.
- apply the appropriate characterization methods for polymeric microstructures.
- demonstrate the need to use several characterization techniques to characterize over multiple length scales.
- evaluate the mechanical, chemical and electrical performance of metals, ceramics and polymer samples.
- demonstrate the relationship between processing-structure-property for selected materials.
- interpret the reliability of experimental results using fundamental material science knowledge.

Topical Outline

Week 1: Introduction to the course, policies and safety
Week 2: Safety module
Week 3: Monomer to polymer conversion
Week 4: Powder processing using dry pressing of ceramics
Week 5: Gypsum mold making
Week 6: Colloidal suspensions of ceramic particles
Week 7: Slip casting of ceramics
Week 8: Ceramic sample preparation for microscopy
Week 9: Tensile mechanical properties of metals
Week 10: Tensile mechanical properties of ceramics
Week 11: Effect of temperature on mechanical properties of polymers
Week 12: Effect of strain rate on mechanical properties of polymers
Week 13: Scanning electron microscopy
Week 14: Strength and strength distribution of glass
Week 15: Presentation of findings

Evaluation

Undergraduate

A	85	-	100
B	70	-	85
C	55	-	70
D	40	-	55
F	<		40

Lab notebooks (individual)- 5 %;
Safety Assignment (individual)- 5 %
Pre-lab assignment (individual)- 5 %
Lab reports (group grade)- 45 %
Contribution to the work in the lab and lab reports (individual)- 17.5 %
Midterm exam- 7.5 %;
Final exam- 15 %

Syllabus

Upload File: MSE 3420 Syllabus-20170211164807.pdf

Form

User ID: mskenne Name: Marian Kennedy
Date: 03/16/2017 Number: 29603

Chair, Department Curriculum Committee — Christopher Kitchens 3/17/17 — Date

Department Chair — 3/17/17 — Date

Chair, College Curriculum Committee — Christopher Kitchens — 3/17/2017 — Date

College Dean — Bradley Putman — 3/18/17 — Date

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — 4/7/2017 — Date

Chair, Graduate Curriculum Committee — Date

Provost — 8/24/17 — Date

President — Date

MSE 3420: Structure/Property Laboratory
Spring 2017
(2 Credits)

Meeting Times: Section 1:
Monday 1:25 – 2:15 PM in Olin 200
Monday 2:30 – 4:25 PM in different labs
Wednesday 1:25 – 4:25 PM in different labs

Section 2:
Monday 1:25 – 2:15 PM in Olin 200
Tuesday 12:30-3:00 PM in different labs
Thursday 12:30-3:00 PM in different labs

Instructor:
INSTRUCTOR NAME
office: INSTRUCTOR OFFICE
phone: INSTRUCTOR PHONE
email: INSTRUCTOR EMAIL (Preferred method of contact)

Office Hours: Tu 3.30-4.30 pm, Th 3.30-4.30 pm

Teaching Assistants:
TA NAME (TA EMAIL)

Course Description:
Materials processing, microstructure and properties related laboratory experiments to provide a basic understanding of the interrelationships between processing, microstructure and properties of materials.

Pre-requisites:
MS&E 2410

Required Safety Equipment and Notebook:
All students must have the following:
- Safety glasses
- Lab coat
- A lab note book with numbered pages that cannot be taken out (easily) from the book. Good examples of what will be needed (and available at the Clemson Book Store) are at: http://clemson.bncollege.com/webapp/wcs/stores/servlet/ProductSearchCommand?displayImage=N&catalogId=10001&langId=-1&storeId=13558&extSearchEnabled=G&search=laboratory%20notebook

Course objectives:
1. To introduce students to the important experimental techniques in materials science and engineering
2. To reinforce the interrelationships between processing-structure-properties for a broad range of materials.
3. To provide an opportunity to obtain hands on experience with procedures that are commonly used to process materials, evaluate their structure at different length scales and to determine the properties of materials.
4. To relate the academic knowledge obtained in other courses to hands-on-experience.
5. To reinforce general aspects of good laboratory practice including safety, note keeping, data analysis and reporting.

Expected student outcomes:
Students will be able to:
- demonstrate how to safely work within a materials science laboratory.

MSE 3420: Structure/Property Laboratory
Spring 2017
(2 Credits)

- apply the appropriate methods to process selected ceramics, metals and polymers.
- apply the appropriate characterization methods for metallic microstructures.
- apply the appropriate characterization methods for ceramic microstructures.
- apply the appropriate characterization methods for polymeric microstructures.
- demonstrate the need to use several characterization techniques to characterize over multiple length scales.
- evaluate the mechanical, chemical and electrical performance of metals, ceramics and polymer samples.
- demonstrate the relationship between processing-structure-property for selected materials.
- interpret the reliability of experimental results using fundamental material science knowledge.

Required text:

There is no required text for this class. However, the instructors will post reading material on Blackboard. It is the student's responsibility to monitor these folders for class resources. For every lab, detailed modulus will be posted on the Blackboard. The students are required to study them before coming to the lab.

Class policy:

- You are expected to wait 10 minutes for the professors/TAs to arrive. If the professor/TA is over 10 minutes late, you may assume there is no class and leave.
- During lecture, you are expected to give your complete attention to the lecture. You will be dismissed from class if you become a distraction for other students or the instructor.
- Unless otherwise instructed, you cannot have your laptop on or cell phone on ring (turned off or on vibrate is fine). You may not answer your phone in class, but instead may walk into the hall to answer.
- Class and laboratory sessions are mandatory and attendance is required otherwise the student will get a zero grade for the lab report. Makeup labs will be given only for pre-arranged, excused absences (medical or family emergency, required academic or other University activities). Please contact the instructor as far in advance as possible before the absence.
- Students are expected to be on time for laboratory sessions. You are responsible for the group effort and are accountable to your group for attendance, work and punctuality.
- Safety glasses and lab coats are required for all laboratory experiments. Please bring them to every lab session. Students are responsible for the cleaning and maintenance of lab coats and safety glasses.
- All laboratory reports shall be type written, there are no exceptions.
- Absolutely no food or drink in the laboratory at all times.
- Laboratory reports are due at the beginning of class on the due date. 10% will be deducted from the grade for each day (or part thereof) of delay. No reports will be accepted after three days of the due date.

Contacting the Instructors and TAs

Student should email the instructor to set up appointments or in instances of sickness, travel, etc. When emailing the instructor, please use the following format:

- Subject line should include the name of course and your section
- Address faculty members and TAs by their names
- Describe reason for contact in complete sentences.
- Sign email with name and contact information (email, phone number)

Email should NOT be used for questions about course content or grades. To discuss these topics, students should attend office hours or set up separate appointments.

Homework:

MSE 3420: Structure/Property Laboratory
Spring 2017
(2 Credits)

The homework for this course will constitute of reading the lab handout and summarizing it in the lab notebook before coming to the lab (individually) and group lab reports. On occasion, there will be other home work assignments.

Exams:

There will be two short exams and a final exam in the course.

Grading:

Lab notebooks (individual):	5 %
Safety Assignment (individual):	5 %
Pre-lab assignment (individual):	5 %
Lab reports (group grade):	45 %
Contribution to the work in the lab and lab reports (individual)*	17.5 %
Midterm exam:	7.5 %
Final exam:	15 %

*This part will be based, in part, on assessment of contributions by peers and self (will be done twice during the semester)

Likely grade scale (downward adjustments only if needed)

85 – 100 %:	A
70 – 85 %	B
55 – 70 %	C
40 – 55 %	D

This course addresses the following outcomes listed in Criterion 3:

- Function on multidisciplinary teams
- Communicate effectively
- Need for, and an ability to engage in life-long learning
- Understanding of professional and ethical responsibility.
- A knowledge of contemporary issues

Assessability Statement: (Taken from Clemson University Academic Policy):

Clemson University values the diversity of our student body as a strength and a critical component of our dynamic community. Students with disabilities or temporary injuries/conditions may require accommodations due to barriers in the structure of facilities, course design, technology used for curricular purposes, or other campus resources. Students who experience a barrier to full access to this class should let the professor know, and make an appointment to meet with a staff member in Student Accessibility Services as soon as possible. You can make an appointment by calling 864-656-6848, by emailing studentaccess@lists.clemson.edu, or by visiting Suite 239 in the Academic Success Center building. Appointments are strongly encouraged – drop-ins will be seen if at all possible, but there could be a significant wait due to scheduled appointments. Students who receive Academic Access Letters are strongly encouraged to request, obtain and present these to their professors as early in the semester as possible so that accommodations can be made in a timely manner. It is the student's responsibility to follow this process each semester. You can access further information here: http://www.clemson.edu/campus-life/campus-services/sds/.

Academic Integrity (Taken from Clemson University Academic Policy):

"As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of

this institution as a 'high seminary of learning.' Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form."

When, in the opinion of a course instructor, there is evidence that a student has committed an act of academic dishonesty, the instructor must make a formal written charge of academic dishonesty, including a description of the misconduct to Dr. Jeff Appling, Associate Dean of Undergraduate Studies. The reporting instructor may, at his/her discretion, inform each involved student privately of the nature of the alleged charge. In cases of plagiarism (I.B.2.) instructors may use the Plagiarism Resolution Form 2 available from the Office of Undergraduate Studies. Instructors using this form for the first time must consult with Dr. Appling (656-3022) prior to meeting with the student. Instructors suspecting a violation of the academic integrity policy should not assign a grade penalty until the process is complete. For suspected academic dishonesty outside the course setting, please consult with the Associate Dean of Undergraduate Studies. Instructors should include a class policy on submission of work that has been turned in for credit for a previous course. Please call 656-3022 with any questions about academic integrity.

Clemson University Title IX Statement (Taken from Clemson University Academic Policy):

Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity (e.g., opposition to prohibited discrimination or participation in any complaint process, etc.) in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This policy is located at http://www.clemson.edu/campus-life/campus-services/access/title-ix/. Mr. Jerry Knighton is the Clemson University Title IX Coordinator. He also is the Director of Access and Equity. His office is located at 111 Holtzendorff Hall, 864.656.3181 (voice) or 864.565.0899 (TDD).

Tentative Lab Topics and Schedule (depending on the availability of the equipment, the topic and the schedule maybe modified)

Week 1: Introduction to the course, policies and safety
Week 2: Safety module
Week 3: Monomer to polymer conversion
Week 4: Powder processing using dry pressing of ceramics
Week 5: Gypsum mold making
Week 6: Colloidal suspensions of ceramic particles
Week 7: Slip casting of ceramics
Week 8: Ceramic sample preparation for microscopy
Week 9: Tensile mechanical properties of metals
Week 10: Tensile mechanical properties of ceramics
Week 11: Effect of temperature on mechanical properties of polymers
Week 12: Effect of strain rate on mechanical properties of polymers
Week 13: Scanning electron microscopy
Week 14: Strength and strength distribution of glass
Week 15: Presentation of findings

Delete Undergraduate Course

Delete a Course

Subject:	MSE-Materials Sci and Eng
Number:	3950
Effective Term:	Fall 2018
Title:	Honors Research I
☑ Delete Honors Course:	MSE 3950
Last Term Course was taught:	201608

Brief Statement of Change Based on Assessment Results:
We are seeking to remove this course from the course catalog since this course is no longer a requirement for departmental honors and is not required within any curriculum track. This change has already been approved by the Honors College Curriculum Committee (December 2016).

Rationale for Delete Course

- ☑ Strengthen Program Requirement(s)
- ☑ Alignment of Student Learning Outcomes
- ☐ Alternative Delivery of Content
- ☐ Improve Time to Degree
- ☐ Evolution of the Discipline
- ☐ Changing Prerequisites
- ☐ Address DWF Rates
- ☐ General Education Modifications
- ☐ Other (Please specify.)

Form

User ID:	mskenne	Name:	Marian Kennedy
Date:	03/16/2017	Number:	29600

Chair, Department Curriculum Committee — 3/17/17 (Date)

Department Chair — 3/17/17 (Date)

Chair, College Curriculum Committee — Christopher Kitchens — 3/17/2017 (Date)

College Dean — Bradley Pitman — 3/18/17 (Date)

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — 2/7/2017 (Date)

Chair, Graduate Curriculum Committee — Date

Provost — 8/24/17 (Date)

President — Date

Change 4000/6000 Course

Change a Course

Subject: MSE-Materials Sci and Eng
Number: 4020/6020
Effective Term: Fall 2018
Title: Solid State Material
Honors Course:
☐ Add Honors Course:
Last Term Course was taught: 201508
Brief Statement of Change Based on Assessment Results:
Evolution of field and better alignment of student learning outcomes throughout curriculum.

Rationale for Changing a Course

- ☑ Strengthen Program Requirement(s)
- ☐ Alignment of Student Learning Outcomes
- ☐ Alternative Delivery of Content
- ☐ Improve Time to Degree
- ☐ Evolution of the Discipline
- ☐ Changing Prerequisites
- ☐ Address DWF Rates
- ☐ General Education Modifications
- ☐ Other (Please specify.)

☑ Change Catalog Description

From Discussion of the properties of solids as related to structure and bonding with emphasis on electronic materials. Band structure theory, electronic, and optical properties are treated.

To Discussion of the properties of solids as related to structure, bonding and defects. Mechanical, thermal, electric, magnetic, electronic, optical, and nuclear properties are treated.

Learning Objectives

MSE 4020 students will be able to:
1) Explain the difference between the various crystal lattices and crystal structures.
2) Apply knowledge of the quantum nature of atoms and chemical bonding to explain the properties of solid materials.
3) Analyze X-ray diffraction results.
4) Describe the different types of point defects and compute defect reactions using the Kröger-Vink notation.
5) Explain how crystal structure and defects influence the mechanical, dielectric, magnetic, electronic, optical, and thermal properties of materials.

MSE 6020 students will be able to:
1) Explain and apply terminology associated with inorganic non-metallic materials
2) Explain and apply point defects and their formation
3) Explain and apply mechanical, thermal, electric, magnetic, electronic, optical, and nuclear properties of materials with mathematics
4) Explain and apply the properties of solids as related to structure and chemical bonding with mathematics
5) Solve crystallographic problems and compare to measurements

Topical Outline

Week 1 – Atoms: quantum numbers; orbitals; Aufbau principle; Madelung principle
Week 2 – Periodic table; electronegativity; ionic radii
Week 3 – Chemical bonding: ionic, covalent, secondary bonds
Week 4 – Crystallography I: lattice; unit cell; crystallographic structure
Week 5 – Crystallography II: planes; directions; symmetry; interstitials; coordination number; Pauling rules
Week 6 – Crystallography III: X-ray diffraction; Vegard's law; packing
Week 7 – Defects I: point defects; Kröger-Vink notation; doping
Week 8 – Defects II: defect reactions
Week 9 – Defects III: structural aspects of composition variation
Week 10 – Defects and materials properties I: extended defects, diffusion
Week 11 – Defects and materials properties II: ionic and electronic conductivity
Week 12 – Defects and materials properties III: magnetic, optical
Week 13 – Materials properties I: mechanical, insulating, electronic
Week 14 – Materials properties II: thermal magnetic, optical
Week 15 – Materials properties III: nuclear, advanced materials

Add course requirements for 6000-level courses

Students will complete a term paper on recent advancements within the field of solid state materials. These term papers will be based off of journal article critiques. In addition, these students will complete all assignments as individuals whereas students in the 4020 course will be able to work as groups in assignment completion.

Evaluation

4000

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Homework and pop-quiz average (1/4 final grade)
Two group presentations (1/2 final grade)
One final exam (1/4 final grade)

6000

A	90	-	100
B	80	-	89
C	70	-	79
F	<		70

Homework and pop-quiz average (1/4 final grade)
Two individual presentations (1/2 final grade)
One final exam (1/4 final grade)

Syllabus

Upload File: MSE 4020 Syllabus-20170211170612.pdf

Form

User ID: mskenne **Name:** Marian Kennedy
Date: 03/16/2017 **Number:** 29606

Chair, Department Curriculum Committee — Date: 3/17/17

Department Chair — Date: 3/17/17

Chair, College Curriculum Committee: Christopher Kitchens — Date: 3/17/2017

College Dean: Bradley Putman — Date: 3/18/17

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date: 4/7/2017

Chair, Graduate Curriculum Committee — Date

Provost: Robert H Jones — Date: 8/24/17

President — Date

MSE 4020/6020: Solid State Materials
Course Syllabus

3 Credits; 3 Contact Hours per week

Instructor:
INSTRUCTOR NAME
office: INSTRUCTOR OFFICE
phone: INSTRUCTOR PHONE
email: INSTRUCTOR EMAIL (Preferred method of contact)

Office Hours: Tu 3.30-4.30 pm, Th 3.30-4.30 pm

Teaching Assistant: TA NAME
office: TA OFFICE
email: TA EMAIL (Preferred method of contact)

Prerequisites: MS&E 326, MTHSC 208, & PHYS 221

Required texts:
"Understanding Solids" by Richard Tilley (Publisher: Wiley, 2nd edition, 2013)
"Defects in Solids" by Richard Tilley (Publisher: Wiley, 1st edition, 2008)

Additional reading materials:
"Introduction to Ceramics" by W.D. Kingery, H.K. Bowen, and D.R. Uhlmann
"Fundamentals of Ceramics" by M.W. Barsoum

Additional required materials: none

Course Description: Discussion of the properties of solids as related to structure, bonding and defects. Mechanical, thermal, electric, magnetic, electronic, optical, and nuclear properties are treated.

Specific goals for the course: This course focuses on crystalline inorganic solids. Students will learn about *i*) the atom, the elements, how they are organized in the periodic table, and how to take advantage of this periodicity from the perspective of materials engineering; *ii*) chemical bonding, crystallographic structure of solids, defects, and experimental techniques able to probe the microstructure of materials; *iii*) mechanical, dielectric, magnetic, electronic, optical, thermal, and nuclear properties of materials, and how they relate to the structure of materials; *iv*) special topics: nanomaterials and quantum physics.

Expected student outcomes:

MSE 4020 students will be able to:
1) Explain the difference between the various crystal lattices and crystal structures.
2) Apply knowledge of the quantum nature of atoms and chemical bonding to explain the properties of solid materials.

3) Analyze X-ray diffraction results.
4) Describe the different types of point defects and compute defect reactions using the Kröger-Vink notation.
5) Explain how crystal structure and defects influence the mechanical, dielectric, magnetic, electronic, optical, and thermal properties of materials.

MSE 6020 students will be able to:

1) Explain and apply terminology associated with inorganic non-metallic materials
2) Explain and apply point defects and their formation
3) Explain and apply mechanical, thermal, electric, magnetic, electronic, optical, and nuclear properties of materials with mathematics
4) Explain and apply the properties of solids as related to structure and chemical bonding with mathematics
5) Solve crystallographic problems and compare to measurements

Criterion 3 ABET outcomes:

The course addresses the following outcomes listed in Criterion 3:

(a) Knowledge of mathematics, science, and engineering.
(e) Identify, formulate and solve engineering problems.

Topics covered & Topical Outline:

Week 1 – Atoms: quantum numbers; orbitals; Aufbau principle; Madelung principle
Week 2 – Periodic table; electronegativity; ionic radii
Week 3 – Chemical bonding: ionic, covalent, secondary bonds
Week 4 – Crystallography I: lattice; unit cell; crystallographic structure
Week 5 – Crystallography II: planes; directions; symmetry; interstitials; coordination number; Pauling rules
Week 6 – Crystallography III: X-ray diffraction; Vegard's law; packing
Week 7 – Defects I: point defects; Kröger-Vink notation; doping
Week 8 – Defects II: defect reactions
Week 9 – Defects III: structural aspects of composition variation
Week 10 – Defects and materials properties I: extended defects, diffusion
Week 11 – Defects and materials properties II: ionic and electronic conductivity
Week 12 – Defects and materials properties III: magnetic, optical
Week 13 – Materials properties I: mechanical, insulating, electronic
Week 14 – Materials properties II: thermal magnetic, optical
Week 15 – Materials properties III: nuclear, advanced materials

Grading:

MSE 4020 students:

Homework and pop-quiz average (1/4 final grade)
Two group presentations (1/2 final grade)
One final exam (1/4 final grade)

Grading Scale: 90-100% A; 80-89% B; 70-79% C; 60-69% D; 0-59% F.

MSE 6020 students:

Homework and pop-quiz average (1/4 final grade)
Two individual presentations (1/2 final grade)
One final exam (1/4 final grade)
Grading Scale: 90-100% A; 80-89% B; 60-79% C; 0-59% F.

Accessibility Statement: (taken from Clemson University Academic Policy):

Clemson University values the diversity of our student body as a strength and a critical component of our dynamic community. Students with disabilities or temporary injuries/conditions may require accommodations due to barriers in the structure of facilities, course design, technology used for curricular purposes, or other campus resources. Students who experience a barrier to full access to this class should let the professor know, and make an appointment to meet with a staff member in Student Accessibility Services as soon as possible. You can make an appointment by calling 864-656-6848, by emailing studentaccess@lists.clemson.edu, or by visiting Suite 239 in the Academic Success Center building. Appointments are strongly encouraged – drop-ins will be seen if at all possible, but there could be a significant wait due to scheduled appointments. Students who receive Academic Access Letters are strongly encouraged to request, obtain and present these to their professors as early in the semester as possible so that accommodations can be made in a timely manner. It is the student's responsibility to follow this process each semester. You can access further information here: http://www.clemson.edu/campus-life/campus-services/sds/.

Integrity Statement:

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Undergraduate Students Additional Information on Integrity:

When, in the opinion of a course instructor, there is evidence that a student has committed an act of academic dishonesty, the instructor must make a formal written charge of academic dishonesty, including a description of the misconduct to Dr. Jeff Appling, Associate Dean of Undergraduate Studies. The reporting instructor may, at his/her discretion, inform each involved student privately of the nature of the alleged charge. In cases of plagiarism (I.B.2.) instructors may use the Plagiarism Resolution Form 2 available from the Office of Undergraduate Studies. Instructors using this form for the first time must consult with Dr. Appling (656-3022) prior to meeting with the student. Instructors suspecting a violation of the academic integrity policy should not assign a grade penalty until the process is complete. For suspected academic dishonesty outside the course setting, please consult with the Associate Dean of Undergraduate Studies. Instructors should include a class policy on submission of work that has been turned in for credit for a previous course. Please call 656-3022 with any questions about academic integrity.

Graduate Students Additional Information on Integrity:

Please refer students to the current Graduate School Policy Handbook for the graduate academic integrity policy.

Title IX:

Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity (e.g., opposition to prohibited discrimination or participation in any complaint process, etc.) in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This policy is located at http://www.clemson.edu/campus-life/campus-services/access/title-ix/. Mr. Jerry Knighton is the Clemson University Title IX Coordinator. He also is the Director of Access and Equity. His office is located at 111 Holtzendorff Hall, 864.656.3181 (voice) or 864.565.0899 (TDD).

Change 4000/6000 Course

Change a Course

Subject: MSE-Materials Sci and Eng
Number: 4130/6130
Effective Term: Fall 2018
Title: Noncrystalline Materials
Honors Course:
☐ Add Honors Course:
Last Term Course was taught: 201608
Brief Statement of Change Based on Assessment Results:
Evolution of field and better alignment of student learning outcomes throughout curriculum.

Rationale for Changing a Course

- ☐ Strengthen Program Requirement(s)
- ☐ Alignment of Student Learning Outcomes
- ☐ Alternative Delivery of Content
- ☐ Improve Time to Degree
- ☑ Evolution of the Discipline
- ☐ Changing Prerequisites
- ☐ Address DWF Rates
- ☐ General Education Modifications
- ☐ Other (Please specify.)

☑ Change Catalog Description

From Study of the fundamentals of the noncrystalline state. Includes cooling kinetics and effects on formation as well as physical properties of noncrystalline sub¬stances in metallic, polymeric, and ceramic systems.

To Study of the fundamentals of noncrystalline substances. Includes formation principles, melting, immiscibility, and structures as well as physical properties of noncrystalline substances.

Learning Objectives

Student Learning Outcomes - 4130
Students will be able to:

- demonstrate the ability to discuss amorphous materials using technical terminology.
- correlate the attributes and physical properties of common commercial glass products to their melting/forming processes.
- explain the commercial oxide glass families, their nominal chemical composition, and their key properties that are important for applications.
- explain fundamental knowledge related to glass melting and forming including annealing of the more common commercial glass products.

Student Learning Outcomes - 6130
Students will be able to:

- demonstrate the ability to discuss crystalline and amorphous materials using technical terminology.
- correlate the attributes and physical properties of common commercial glass products to their melting/forming processes.
- explain the commercial oxide glass families, their nominal chemical composition, and their key properties that are important for applications.
- explain fundamental knowledge related to glass melting and forming including annealing of the more common commercial glass products.
- Synthesize recent advancements in amorphous materials reported within technical journals

Topical Outline

Week	Lecture Topic
1	Introduction/ Glass history and definition
2	Principle of glass formation
3	Glass melting
3	Glass melting
4	Immiscibility/phase separation
5	Structure of glasses
6	Exam 1 Review/ Exam 1
7	Structure of glasses
8	Structure of glasses
9	Viscosity and relaxation behavior
10	Density and thermal expansion, Exam 2 Review/ Exam 2
11	Transport properties
12	Mechanical properties
13	Optical properties
14	Quiz and research seminar about glass
15	Project Presentation
16	Final Exam Review/ Final Exam

Evaluation

4000

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

1.Homework assignments 10%
2. Quizzes 25%
3. Midterm exam 25%
4. Final exam 40%

6000

A	90	-	100
B	80	-	89
C	70	-	79
F	<		70

1. Homework assignments 10%
2. Quizzes 20%
3. Midterm exam 20%
4. Project 20%
5. Final exam 30%

Syllabus

Upload File: MSE4130 6130 Syllabus-20170211172447.pdf

Form

User ID: mskenne **Name:** Marian Kennedy
Date: 03/17/2017 **Number:** 29611

Chair, Department Curriculum Committee — Date: 3/17/17

Department Chair — Date: 3/17/17

Chair, College Curriculum Committee — Christopher Kitchens — Date: 3/17/2017

College Dean — Bradley Putman — Date: 3/18/17

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date: 4/7/2017

Chair, Graduate Curriculum Committee — Date

Provost — Robert B. Jones — Date: 8/24/17

President — Date

MSE 4130 / 6130: Noncrystalline Materials
3 Credits
Spring 2017

Course Meeting Times and Location:
Tuesday and Thursday, 12:30 – 1:45 PM, 154 Sirrine Hall.

Instructor: INSTRUCTOR NAME
office: INSTRUCTOR OFFICE
phone: INSTRUCTOR PHONE
email: INSTRUCTOR EMAIL (Preferred method of contact)

Office Hours: Tu 3.30-4.30 pm, Th 3.30-4.30 pm

Teaching Assistant: TA NAME
office: TA OFFICE
email: TA EMAIL (Preferred method of contact)

Course Prerequisites :
MSE 3260 and 4020 for MSE4130 participants.
MSE 6020 or other equivalent course for MSE 6130 participants.
Students who have not met the prerequisites for this course are taking it at their own risk.

Textbook
"Introduction to Glass Science and Technology", 2nd edition, by J.E. Shelby, Cambridge: Royal Society of Chemistry, c2005.
Pertinent information may also be found in text of "Fundamentals of Inorganic Glasses", 2nd edition, by A.K. Varshneya.

Additional Materials
Handouts will be provided prior to the class.

Student Learning Outcomes - 4130
Students will be able to:
- demonstrate the ability to discuss amorphous materials using technical terminology.
- correlate the attributes and physical properties of common commercial glass products to their melting/forming processes.
- explain the commercial oxide glass families, their nominal chemical composition, and their key properties that are important for applications.
- explain fundamental knowledge related to glass melting and forming including annealing of the more common commercial glass products.

Student Learning Outcomes - 6130
Students will be able to:
- demonstrate the ability to discuss crystalline and amorphous materials using technical terminology.
- correlate the attributes and physical properties of common commercial glass products to their melting/forming processes.
- explain the commercial oxide glass families, their nominal chemical composition, and their key properties that are important for applications.
- explain fundamental knowledge related to glass melting and forming including annealing of the more common commercial glass products.

MSE 4130 / 6130: Noncrystalline Materials
3 Credits
Spring 2017

- Synthesize recent advancements in amorphous materials reported within technical journals

Class Policies

1. You are expected to wait **10** minutes for Prof. Tong to arrive. If Prof. Tong is **over 10** minutes late, you may assume there is no class and leave.
2. You are expected to attend every class. If you miss more than three classes, which are unexcused, the instructor may drop you.
3. During lecture, you are expected to give your complete attention to the lecture. You will be dismissed from class if you become a distraction for other students or the instructor.
4. Unless otherwise instructed, you cannot have your laptop on or cell phone on ring (turned off or on vibrate is fine). You may not answer your phone in class. If you are awaiting a phone call, you may walk outside to take it.
5. Any exam that was scheduled at the time of a class cancellation due to inclement weather will be given at the next class meeting unless contacted by the instructor. Any assignments due at the time of a class cancellation due to inclement weather will be due at the next class meeting unless contacted by the instructor. Any extension or postponement of assignments or exams must be granted by the instructor via email within 24 hours of the weather related cancellation."

Evaluation and Grading:

For MSE 4130:

1.	Homework assignments	10%
2.	Quizzes	25%
3.	Midterm exam	25%
4.	Final exam	40%
		100%

For MSE 6130:

1.	Homework assignments	10%
2.	Quizzes	20%
3.	Midterm exam	20%
4.	Project	20%
5.	Final exam	30%
		100%

The final exam is fully comprehensive. An average percentage will be evaluated using above listed distribution and dropping the lowest grade for a quiz.

The grading scale for 4130 given below will be used yet may be scaled
90-100 = **A** 80-89.99 =**B** 70-79.99 = **C** 60-69.99 = **D** Below 60 = **F**

The grading scale for 6130 given below will be used yet may be scaled
90-100 = **A** 80-89.99 =**B** 70-79.99 = **C** Below 70 = **F**

Relationship of Course to ABET Criterion 3 Objectives

(a) Knowledge of mathematics, science, and engineering.
(f) Understanding of professional and ethical responsibility.

MSE 4130 / 6130: Noncrystalline Materials
3 Credits
Spring 2017

Integrity Statement:

"As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a 'high seminary of learning.' Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form. In instances where academic standards may have been compromised, Clemson University has a responsibility to respond appropriately to charges of violations of academic integrity."

Undergraduate Students Additional Information on Integrity:

When, in the opinion of a course instructor, there is evidence that a student has committed an act of academic dishonesty, the instructor must make a formal written charge of academic dishonesty, including a description of the misconduct to Dr. Jeff Appling, Associate Dean of Undergraduate Studies. The reporting instructor may, at his/her discretion, inform each involved student privately of the nature of the alleged charge. In cases of plagiarism (I.B.2.) instructors may use the Plagiarism Resolution Form 2 available from the Office of Undergraduate Studies. Instructors using this form for the first time must consult with Dr. Appling (656-3022) prior to meeting with the student. Instructors suspecting a violation of the academic integrity policy should not assign a grade penalty until the process is complete. For suspected academic dishonesty outside the course setting, please consult with the Associate Dean of Undergraduate Studies. Instructors should include a class policy on submission of work that has been turned in for credit for a previous course. Please call 656-3022 with any questions about academic integrity.

Graduate Students Additional Information on Integrity:

Please refer students to the current Graduate School Policy Handbook for the graduate academic integrity policy.

Accessibility Statement

Students with disabilities or temporary injuries/conditions may require accommodations due to barriers in the structure of facilities, course design, technology used for curricular purposes, or other campus resources. Students who experience a barrier to full access to this class should let the professor know, and make an appointment to meet with a staff member in Student Accessibility Services as soon as possible. You can make an appointment by calling 864-656-6848, by emailing studentaccess@lists.clemson.edu, or by visiting Suite 239 in the Academic Success Center building. Appointments are strongly encouraged – drop-ins will be seen if at all possible, but there could be a significant wait due to scheduled appointments. Students who receive Academic Access Letters are strongly encouraged to request, obtain and present these to their professors as early in the semester as possible so that accommodations can be made in a timely manner. It is the student's responsibility to follow this process each semester. You can access further information here: http://www.clemson.edu/campus-life/campus-services/sds/.

The Clemson University Title IX (Sexual Harassment) statement

Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This policy is located at http://www.clemson.edu/campus-life/campus-services/access/title-ix/. Mr. Jerry Knighton is the Clemson University Title IX

MSE 4130 / 6130: Noncrystalline Materials
3 Credits
Spring 2017

Coordinator. He also is the Director of Access and Equity. His office is located at 110 Holtzendorff Hall, 864.656.3184 (voice) or 864.656.0899 (TDD).

Tentative (i.e., subject to change) Outline

Week	Lecture Topic
1	Introduction/ Glass history and definition
2	Principle of glass formation
3	Glass melting
3	Glass melting
4	Immiscibility/phase separation
5	Structure of glasses
6	Exam 1 Review/ Exam 1
7	Structure of glasses
8	Structure of glasses
9	Viscosity and relaxation behavior
10	Density and thermal expansion, Exam 2 Review/ Exam 2
11	Transport properties
12	Mechanical properties
13	Optical properties
14	Quiz and research seminar about glass
15	Project Presentation
16	Final Exam Review/ Final Exam

Change 4000/6000 Course

Change a Course

Subject: MSE-Materials Sci and Eng
Number: 4150/6150
Effective Term: Fall 2018
Title: Intro to Polymer Sci. and Eng.
Honors Course:
☐ Add Honors Course:
Last Term Course was taught: 201608
Brief Statement of Change Based on Assessment Results:
Evolution of field and better alignment of student learning outcomes throughout curriculum.

Rationale for Changing a Course

- ☑ Strengthen Program Requirement(s)
- ☐ Alignment of Student Learning Outcomes
- ☐ Alternative Delivery of Content
- ☐ Improve Time to Degree
- ☑ Evolution of the Discipline
- ☐ Changing Prerequisites
- ☐ Address DWF Rates
- ☐ General Education Modifications
- ☐ Other (Please specify.)

☑ Change Catalog Description

From Chemistry of monomers and polymers and the chemical and physical properties of polymers are discussed emphasizing fiber form¬ing, synthetic polymers. Includes molecular charac¬terization, structure, morphology, and mechanical properties as they relate to the design of polymer systems for end uses in textiles, geotextiles, plastics and fiber-reinforced composite materials.

To This course provides a comprehensive introduction to the synthesis, properties, design, and applications of polymeric materials. Topics will include molecular characterization, structure, morphology, chemical and physical behavior of the polymers. Students will gain knowledge about the principles and the modern conception of advanced polymeric materials.

Learning Objectives

MSE 4150 Student Learning Objectives
Students will be able to:

- demonstrate the ability to discuss polymeric materials using technical terminology.
- demonstrate their knowledge of chemical composition and chemical architecture of polymers.
- categorize types of polymerization reactions
- predict the role of kinetics in polymeric synthesis.
- Articulate the types of microstructures in polymeric materials and explain the thermodynamic principles governing microstructure developments.
- describe common experimental techniques for characterization and identification of polymeric materials.
- explain factors and principles impacting polymer solubility.
- describe phase transitions in polymers and thermodynamic principles governing phase transformations.
- compare the basic mechanical properties associated with polymeric structures

MSE 6150 Student Learning Objectives
Students will be able to:

- consistently utilize technical terminology to discuss polymeric materials using technical terminology.
- demonstrate their knowledge of chemical composition and chemical architecture of polymers.
- categorize types of polymerization reactions
- predict the role of kinetics in polymeric synthesis.
- Articulate the types of microstructures in polymeric materials and explain the thermodynamic principles governing microstructure developments.
- explain common experimental techniques for characterization and identification of polymeric materials.
- explain factors and principles impacting polymer solubility.
- Explain the phase transitions in polymers and thermodynamic principles governing phase transformations.

Topical Outline

Week 1: Trends and problems of polymer science and engineering.
Week 2: Basic conceptions in polymer materials science and classification of polymeric materials.
Week 3: Chemical composition and chemical architecture of polymers.
Week 4: Synthesis of polymers by step-growth polymerization.
Week 5: Kinetics of step growth polymerization processes.
Week 6: Synthesis of polymers by chain-growth polymerization.
Week 7: Kinetics of chain growth polymerization processes.
Week 8: Chain-growth copolymerization
Week 9: Microstructures in polymeric materials; isolated chains, local molecular ordering.
Week 10: Microphase structures, supramolecular organization.
Week 11: Modern experimental techniques for characterization and identification of polymeric materials:
Week 12: Solubility of polymers and polymer solutions.
Week 13: Phase states and state transformations in polymers, thermal properties of polymers.
Week 14: Mechanical properties of polymers: elastic and plastic deformation,
Week 15: Polymer rheology and thermomechanical behavior.

Evaluation

4000			6000		
A	90 -	100	A	90 -	100
B	80 -	89	B	80 -	89
C	70 -	79	C	70 -	79
D	60 -	69	F	<	70
F	<	60			

Homework assignments- 10%
Quizzes- 25%
Midterm exam- 25%
Final exam- 40%

Homework assignments- 10%
Quizzes- 20%
Midterm exam- 20%
Project- 20%
Final exam- 30%

Syllabus

Upload File: MSE_4150 6150 Syllabus-20170213154816.pdf

Form

User ID: mskenne **Name:** Marian Kennedy
Date: 03/17/2017 **Number:** 29648

Chair, Department Curriculum Committee — Date 3/17/17

Department Chair — Date 3/17/17

Chair, College Curriculum Committee — Date 3/17/2017

College Dean — Date 3/18/17

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date 4/7/2017

Chair, Graduate Curriculum Committee — Date

Provost — Date 8/24/17

President — Date

MSE 4150/H4150/6150: Introduction to Polymer Science and Engineering
3 Credits
SYLLABUS – Spring 2017

Meeting Times:
11:00 am - 12:15 pm: Tu, Th
Riggs Hall 227

Instructor: INSTRUCTOR NAME
office: INSTRUCTOR OFFICE
phone: INSTRUCTOR PHONE
email: INSTRUCTOR EMAIL (Preferred method of contact)

Office Hours: Tu 3.30-4.30 pm, Th 3.30-4.30 pm

Prerequisites: CH 2010 or CH 2240, or consent of instructor

Course objectives:
This course is designed to provide students with a comprehensive introduction to the synthesis, characterization, manufacturing and utilization of polymeric materials and produce an understanding of the principles and the modern conception of advanced polymeric materials.

Topics covered:
Week 1: Trends and problems of polymer science and engineering.
Week 2: Basic conceptions in polymer materials science and classification of polymeric materials.
Week 3: Chemical composition and chemical architecture of polymers.
Week 4: Synthesis of polymers by step-growth polymerization.
Week 5: Kinetics of step growth polymerization processes.
Week 6: Synthesis of polymers by chain-growth polymerization.
Week 7: Kinetics of chain growth polymerization processes.
Week 8: Chain-growth copolymerization
Week 9: Microstructures in polymeric materials; isolated chains, local molecular ordering.
Week 10: Microphase structures, supramolecular organization.
Week 11: Modern experimental techniques for characterization and identification of polymeric materials:
Week 12: Solubility of polymers and polymer solutions.
Week 13: Phase states and state transformations in polymers, thermal properties of polymers.
Week 14: Mechanical properties of polymers: elastic and plastic deformation,
Week 15: Polymer rheology and thermomechanical behavior.

MSE 4150 ***Student Learning Objectives***
Students will be able to:
- demonstrate the ability to discuss polymeric materials using technical terminology.
- demonstrate their knowledge of chemical composition and chemical architecture of polymers.
- categorize types of polymerization reactions
- predict the role of kinetics in polymeric synthesis.
- articulate the types of microstructures in polymeric materials and explain the thermodynamic principles governing microstructure developments.
- describe common experimental techniques for characterization and identification of polymeric materials.
- explain factors and principles impacting polymer solubility.

- describe phase transitions in polymers and thermodynamic principles governing phase transformations.
- compare the basic mechanical properties associated with polymeric structures

MSE 6150 ***Student Learning Objectives***

Students will be able to:

- consistently utilize technical terminology to discuss polymeric materials using technical terminology.
- demonstrate their knowledge of chemical composition and chemical architecture of polymers.
- categorize types of polymerization reactions
- predict the role of kinetics in polymeric synthesis.
- articulate the types of microstructures in polymeric materials and explain the thermodynamic principles governing microstructure developments.
- explain common experimental techniques for characterization and identification of polymeric materials.
- explain factors and principles impacting polymer solubility.
- explain the phase transitions in polymers and thermodynamic principles governing phase transformations.
-

Required Text:

J. R. Fried, Polymer Science and Technology, Prentice Hall, 2003 or 2014

Additional References:

P. C. Painter and M. M. Coleman, Fundamentals of Polymer Science, Technomic, 1997; M. P. Stevens, Polymer Chemistry: an Introduction, Oxford University Press, 1999; C. E. Carraher, Polymer Chemistry, Marcel Dekker, Inc., 2003; L. H. Sperling, Polymeric Multicomponent Materials, John Wiley & Sons, Inc., 1997.

Class Policy:

- Each student is allowed to miss three classes. These three excused absences in no way relieve the student on any class responsibilities. If sickness or other circumstances arise to prevent class attendance, the student should inform the instructor. If more than three classes are missed, a written doctor's excuse is required or the absence is considered unexcused. Extra missing classes will result in one point down from the final grade for each missing class.
- If you miss a quiz or exam, you take a zero. (No exceptions until written doctor's excuse is presented).
- You are expected to wait 15 minutes for a late professor. If the professor is over 15 minutes late, you may assume there is no class and leave.
- No hats will be worn (without a medical reason).
- No food is allowed in the classroom.
- Bottled water is allowed in the classroom.
- Unless otherwise instructed no laptops, no cell phones (turned off or on vibrate is fine). Do not answer your phone.
- During lecture, you are expected to give your complete attention to the lecturer. Any breach of that will result in your dismissal from class.
- Questions of grading and individual disputes must be done in person. This cannot be done by email.

Grading:

For MSE 4150:		
1.	Homework assignments	10%
2.	Quizzes	25%
3.	Midterm exam	25%
4.	Final exam	40%

	100%

For MSE 4150H:

1.	Homework assignments	10%
2.	Quizzes	20%
3.	Midterm exam	20%
3.	Project	15%
3.	Final exam	35%
		100%

For MSE 6150:

1.	Homework assignments	10%
2.	Quizzes	20%
3.	Midterm exam	20%
3.	Project	20%
3.	Final exam	30%
		100%

The final exam is fully comprehensive. An average percentage will be evaluated using above listed distribution and dropping the lowest grade for a quiz.

The grading scale for 4150 given below will be used yet may be scaled
90-100 = **A** 80-89.99 =**B** 70-79.99 = **C** 60-69.99 = **D** Below 60 = **F**

The grading scale for 6150 given below will be used yet may be scaled
90-100 = **A** 80-89.99 =**B** 70-79.99 = **C** Below 70 = **F**

Relationship of course to program objectives:

The course addresses the following outcomes listed in ABET Criterion 3:

(a) Knowledge of mathematics, science, and engineering.
(j) Knowledge of contemporary issues.

Accessibility Statement: (Taken from Clemson University Academic Policy):

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commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form. In instances where academic standards may have been compromised, Clemson University has a responsibility to respond appropriately to charges of violations of academic integrity."

Undergraduate Students Additional Information on Integrity:

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Please refer students to the current Graduate School Policy Handbook for the graduate academic integrity policy.

Title IX:

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Change Undergraduate Course

Change a Course

Subject: MSE-Materials Sci and Eng
Number: 4450
Effective Term: Fall 2018
Title: Practice of Mat Engr
Honors Course:
☐ Add Honors Course:
Last Term Course was taught: 201601
Brief Statement of Change Based on Assessment Results:
Evolution of field and better alignment of student learning outcomes throughout curriculum. Preq changed because course is moving to junior year of the curriculum.

Rationale for Changing a Course

- ☐ Strengthen Program Requirement(s)
- ☑ Alignment of Student Learning Outcomes
- ☐ Alternative Delivery of Content
- ☐ Improve Time to Degree
- ☑ Evolution of the Discipline
- ☑ Changing Prerequisites
- ☐ Address DWF Rates
- ☐ General Education Modifications
- ☐ Other (Please specify.)

☑ Change Catalog Description

From Students working in groups present and discuss practical, ethical, safety, business, and selected technical topics. Invited speakers discuss various aspects of the engineering world. To be taken Pass/ No Pass only. Preq: Senior standing.

To The practice of materials science and engineering include technical knowledge and skills as well as professional skills and business knowledge. This course highlights concepts such as intellectual property protection, methods for making decisions that may arise during appointment in industry, government laboratories, or academia.

☑ Change Prerequisite(s) / Corequisite(s)

From Senior standing.
To Junior standing.

Learning Objectives

Student Learning Outcomes:
The student will be able to:

- formulate and continuously modify a career plan including life-long learning.
- explain the role of ethics and a personal ethical standard for their professional career.
- recommend appropriate steps to be taken by materials engineers facing ethical issues.
- evaluate contemporary issues including environmental evolution, sustainability and cradle-to-grave design.
- assess the need for intellectual property protection within manufacturing and research.
- compose competitive application packages for industrial positions, research positions or graduate school
- articulate the components of benefit packages for those entering industry.

Topical Outline

Week 1- Resumes, Skills, ePortfolio, Career Paths.
Week 2- Interviews and Interview Skills
Week 3- Career Path and Compensation
Week 4- How Global Changes May Impact Your Career
Week 5- How Global Changes May Impact Your Career
Week 6- Introduction to Ethics and Engineering Ethics; Whistleblowing
Week 7- Research and Professional Ethics
Week 8- Career Killing Opportunities
Week 9- Workplace Relations
Week 10- Dealing with Crisis Situations
Week 11- Lifelong Learning
Week 12- ETS Proficiency Profile
Week 13- Professional Licensure; Guest Speaker: TBD
Week 14- Intellectual Property, Patents, Copyrights, Trade Secrets
Week 15- Financial Planning

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

This class is taken on a pass/fail basis. To receive a "pass" grade, the student must attend the required number of classes and participate in class discussions. Class participation will be determined by the Professor's judgment of the student's performance.

Syllabus

Upload File: MSE 4450 Syllabus Final-20170213162314.pdf

Form

User ID: mskenne **Name:** Marian Kennedy
Date: 03/17/2017 **Number:** 29652

Chair, Department Curriculum Committee — Date: 3/17/17

Department Chair — Date: 3/17/17

Chair, College Curriculum Committee — Date: 3/17/2017

College Dean — Date: 3/18/17

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date: 4/7/2017

Chair, Graduate Curriculum Committee — Date

Provost — Date: 8/24/17

President — Date

MSE 4450 Practice of Materials Engineering
MSE 4450

000096

Credits: 1(1,0)

Instructor: INSTRUCTOR NAME
office: INSTRUCTOR OFFICE
phone: INSTRUCTOR PHONE
email: INSTRUCTOR EMAIL (Preferred method of contact)

Office Hours: Sirrine Hall Rm. 299; Wed. 3:30 - 4:30 PM, or by appointment.

Catalog Data: MSE 4450 Practice of Materials Engineering 1(1,0) The practice of materials science and engineering include technical knowledge and skills as well as professional skills and business knowledge. This course highlights concepts such as intellectual property protection, methods for making decisions that may arise during appointment in industry, government laboratories, or academia. To be taken Pass/Fail only. Preq: MSE 4320.

Textbook:
No text book is required

References:
The student will be required to locate and access current literature as part of the class requirement.

Teaching Methods:
Group discussions, student presentations, and guest speakers.

Course Objectives:
The basic objective of this course is making students aware of factors that will contribute to their professional success. Each student must participate in at least ONE class topical area.

Reference:
Section Number - 001; Location/Time: **Kinard 201**; **Wed. 4:30 – 5:20 PM.**

Student Learning Outcomes:
The student will be able to:

- formulate and continuously modify a career plan including life-long learning.
- explain the role of ethics and a personal ethical standard for their professional career.
- recommend appropriate steps to be taken by materials engineers facing ethical issues.
- evaluate contemporary issues including environmental evolution, sustainability and cradle-to-grave design.
- assess the need for intellectual property protection within manufacturing and research.
- compose competitive application packages for industrial positions, research positions or graduate school
- articulate the components of benefit packages for those entering industry.

ABET Criterion 3 outcomes:
(t) Understanding of professional and ethical responsibility
(g) Communicate effectively
(h) Understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) Understand Need for and an ability to engage in life-long learning
(g) Knowledge and life-long engaugement in contemporay issues
(k) Use the techniques, skills, and modern engineering tools necessary for effective and ethical

Attendance Policy:

It is the student's responsibility to attend class. **Students must attend the last class with no absences allowed without the Professor's written permission.** Students missing more than three classes and/or the last class (without the Professor's permission) will receive a "fail" for the class. Three classes absences represent missing 20% of the classes. These attendance policies will be enforced regardless of the reason for the absence. Each student will sign a log at the beginning of each class, as a means to record attendance, or a daily test will be used as a method to verify attendance. If the student forgets to sign the log, he/ she will be counted as absent.

Evaluation:

This class is taken on a pass/fail basis. To receive a "pass" grade, the student must attend the required number of classes and participate in class discussions. Class participation will be determined by the Professor's judgment of the student's performance. If the student does not adequately participate in class discussions, the student will receive one private, verbal warning from the instructor. After the verbal warning, if the student's participation does not improve, a written warning will be issued. If, after the written warning, the student does not adequately participate, then the student will receive a "fail" for the course.

Emergency Procedure:

In the event of emergency, the student should exit the building, proceed to the nearest campus telephone and dial: Ambulance - 656-2244; Fire Department - 656-2211; Police Department - 656-2222.

Contacting the Instructor:

Student should email the instructor to set up appointments or in instances of sickness, travel, etc.
When emailing the instructor, the following format will be used:
(NO RESPSONSES WILL BE PROVIDED IF OTHER FORMAT IS NOT USED)
subject line should include the name of course/section being taken ("MSE4550: YOUR NAME")
address faculty member by name ("Prof. Urban")
describe reason for contact in complete sentences.
sign email with name, department and contact information (email, phone number)

Email should NOT be used for questions about course content or grades. To discuss these topics, students should **ATTEND OFFICE HOURS.**

Assessability Statement: (Taken from Clemson University Academic Policy):

Clemson University values the diversity of our student body as a strength and a critical component of our dynamic community. Students with disabilities or temporary injuries/conditions may require accommodations due to barriers in the structure of facilities, course design, technology used for curricular purposes, or other campus resources. Students who experience a barrier to full access to this class should let the professor know, and make an appointment to meet with a staff member in Student Accessibility Services as soon as possible. You can make an appointment by calling 864-656-6848, by emailing studentaccess@lists.clemson.edu, or by visiting Suite 239 in the Academic Success Center building. Appointments are strongly encouraged – drop-ins will be seen if at all possible, but there could be a significant wait due to scheduled appointments. Students who receive Academic Access Letters are strongly encouraged to request, obtain and present these to their professors as early in the semester as possible so that accommodations can be made in a timely manner. It is the student's responsibility to follow this process each semester. You can access further information here: http://www.clemson.edu/campus-life/campus-services/sds/.

ACADEMIC INTEGRITY:
(Taken from Clemson University Academic Policy):

Academic Integrity (Taken from Clemson University Academic Policy):

"As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a 'high seminary of learning.' Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form."

When, in the opinion of a course instructor, there is evidence that a student has committed an act of academic dishonesty, the instructor must make a formal written charge of academic dishonesty, including a description of the misconduct to Dr. Jeff Appling, Associate Dean of Undergraduate Studies. The reporting instructor may, at his/her discretion, inform each involved student privately of the nature of the alleged charge. In cases of plagiarism (I.B.2.) instructors may use the Plagiarism Resolution Form 2 available from the Office of Undergraduate Studies. Instructors using this form for the first time must consult with Dr. Appling (656-3022) prior to meeting with the student. Instructors suspecting a violation of the academic integrity policy should not assign a grade penalty until the process is complete. For suspected academic dishonesty outside the course setting, please consult with the Associate Dean of Undergraduate Studies. Instructors should include a class policy on submission of work that has been turned in for credit for a previous course. Please call 656-3022 with any questions about academic integrity.

Clemson University Title IX Statement (Taken from Clemson University Academic Policy):

Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity (e.g., opposition to prohibited discrimination or participation in any complaint process, etc.) in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This policy is located at http://www.clemson.edu/campus-life/campus-services/access/title-ix/. Mr. Jerry Knighton is the Clemson University Title IX Coordinator. He also is the Director of Access and Equity. His office is located at 111 Holtzendorff Hall, 864.656.3181 (voice) or 864.565.0899 (TDD).

Honor Code and Academic Integrity Website:

http://www.clemson.edu/cecas/students/honor-code.html.
http:/ /www.clemson.edu/academics/ academic-integrity/

Topic	Discussion Topic Summary of Key Concepts and Ideas*
1	**BEING PROFESSIONAL: WHAT DOES IT MEAN?** **Resumes, Skills, ePortfolio, Career Paths.** - Employee agreements and personality profiling you may be subject to. - How can I best market my skills in today's world? - What are potential employers looking for? - What is the value of experience? Good and bad resumes - tell them what you can DO. - If I can't get a job, what should I do in the interim until I find that dream job? - How has the value of grad school changed from that of my parents' generation?
2	**Interviews and Interview Skills;** how to prepare for a succefful interview; - Speaking skills - Posiitve attitude - Successful marketing of your skills - Know the company before the Interview - Arrive early with a portfolio, notepad, extra resimes - Brush up your conversation etiquette duting meals - Know the names of people you have met and write 'thank you' notes afterwards - **Prepare, Prepare, Prepare**
3	**Career Path and Compensation.** - The life lessons from successful and not very succefful stories; *incremental* change versus *transformative* contributions. - What megatrends will influence my working and private life? - Is versatility important? How do you deal with compensation versus the quality of life? What if I do not like engineering? - How will I change in needs and values as I age?
4	**How Global Changes May Impact Your Career – 1.** - Environmental movements and societal changes - differences between the USA, Europe, and China. - Health and safety regulations - is the federal regulatory process flawed? - International competitiveness - how Europeans and Asians work as opposed to how Americans work.
5	**How Global Changes May Impact Your Career – 2.** - Political changes; your future and what you should do about it - Many applicants for one position - Employers are a lot pickier about who they hire - Changing the field is hard - Applicants are often far below their qualifications
6	**Introduction to Ethics and Engineering Ethics; Whistleblowing** - Developing a personal value system - Companies expect employees to do more with less - What is an ethical conduct?
7	**Research and Professional Ethics;** Importance, Responsibilities, Opportunities, and Conduct. - Knowledge, truth, avoidance of errors, promoting values that are essential to collaborative environment, public accountability, public support, moral and social values. - Codes and policies for research ethics - Ethical decisions making in research and engineering
8	**Career Killing Opportunities:** - Choosing mentors and advisors. Are older people ambitious? - Goals in a first job. Keeping your criticism/gossip to yourself. - Success in a First Job: 1- Meeting deadlines. 2 - Working habits. 3 - Changing jobs often. - Responsibilities when starting a family.

	- What can mess up your future: substance abuse, stealing money, and becoming untrustworthy with masked examples from the legal profession.
9	**Workplace Relations:** How to succeed in competitive wrok environment - Code of conduct - Appropriate and inappropriate behavior - Management boundaries - Importance of ethics and bounaries
10	**Dealing with Crisis Situations:** - Bad things happen to good people; prospering in real time - Managing your job and private life - Relying on your strenghts, professional knowledge, and cummulative experience
11	**Lifelong Learning:** Top 10 things to do early in your career
12	**ETS Proficiency Profile;** Four skills: critical thinking, reading, writng, mathematics
13	**Professional Licensure; Guest Speaker: TBD** How to gain professional registration. Why is it worth the trouble? What you cannot do as an engineer without a PE. The engineer's code of ethics.
14	**Intellectual Property, Patents, Copyrights, Trade Secrets,** Patent Law, To possibly include "Overview of Patent Law", accessible from iTunes University as Engr. 408, Patent Law. - IP and Ethics
15	**Financial Planning -** Personal finance, student loans and financial independence - Personal life vs work responsibilities - Balance between job Input, income, and expendatures.

* - subject to change without prior notice

2017 Spring Break: March 20-24, 2017.

Change Undergraduate Course

Change a Course

Subject: MSE-Materials Sci and Eng
Number: 4600
Effective Term: Fall 2018
Title: Surface Lab
Honors Course:
☐ Add Honors Course:
Last Term Course was taught: 201608

Brief Statement of Change Based on Assessment Results:
Evolution of field and better alignment of student learning outcomes throughout curriculum.

Rationale for Changing a Course

- ☐ Strengthen Program Requirement(s)
- ☐ Alignment of Student Learning Outcomes
- ☐ Alternative Delivery of Content
- ☐ Improve Time to Degree
- ☑ Evolution of the Discipline
- ☐ Changing Prerequisites
- ☐ Address DWF Rates
- ☐ General Education Modifications
- ☐ Other (Please specify.)

☑ Change Catalog Description

From Introduction to surface phenomena focusing on science and engineering of composite materials. The lab covers methods of surface characterization, analyses of liquid adhesion, wetting, and finishing.

To Covers characterization of surfaces and interfaces; surface functionalization techniques, characterization of rheological properties of materials using capillarity; characterization of porous materials; atomic force microscopy of surfaces; effects of surfactants and surface adsorption of chemicals; characterization adsorption kinetics and transport properties of porous materials; surface effects on processing of fibers.

Learning Objectives

The student will be able to:

- explain the types of interfacial phenomena in materials processing and manufacturing.
- display knowledge of thermodynamics of surfaces, adhesion, wetting, finishing, and coating.
- relate surface properties to interactions of liquids and chemicals with fibers and fibrous materials.

Topical Outline

Week 1 Image analysis with Matlab
Week 2 Pendant Drop 1
Week 3 Pendant Drop. 2
Week 4 Interfacial tension of liquid pairs
Week 5 Surfactants with Pendant Drop
Week 6 Dynamic surface tension with surfactants
Week 7 Sessile Drop – contact angle
Week 8 Silanization of surfaces–
Week 9 Sessile drop with functionalized surfaces
Week 10 Block-copolymers, sculptured surfaces
Week 11 Sessile drop with functionalized surfaces
Week 12 Dynamic Contact Angle
Week 13 Viscosity
Week 14 Wicking of resins into fabrics
Week 15 Wicking of resins into nanoporous alumina membranes and nanofiber webs

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Grade will be assigned from final report.
Title Page- 5%
Abstract- 5%
Introduction-15%
Experimental Procedure- 10%
Results and Discussions- 35%
Conclusion 5%
References- 2%
Appendices- 3%
Answers to Questions- 20%

Syllabus

Upload File: MSE 4600 Syllabus-20170213163230.pdf

Form

User ID: mskenne **Name:** Marian Kennedy
Date: 03/16/2017 **Number:** 29655

Chair, Department Curriculum Committee — Date: 3/17/17

Department Chair — Date: 3/17/17

Chair, College Curriculum Committee — Christopher Kitchens — Date: 3/17/2017

College Dean — Bradley Pitman — Date: 3/18/17

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date: 4/7/2017

Chair, Graduate Curriculum Committee — Date

Provost — Robert W Jones — Date: 8/24/17

President — Date

Surface Phenomena in Materials Science and Engineering Laboratory
MSE 4600

Credits: **1** Credits; 3 Contact Hours per week

Instructor:
INSTRUCTOR NAME
office: INSTRUCTOR OFFICE
phone: INSTRUCTOR PHONE
email: INSTRUCTOR EMAIL (Preferred method of contact)

Required Text: There is no textbook for the course; lecture handouts/reading material and references on important papers will be provided. The following texts are recommended:

Adamson, Arthur W. Alice P. Gast, Physical chemistry of surfaces, New York : Wiley, c1997.

Berg John C. An introduction to interfaces and colloids. The bridge to nanoscience. World Scientific, 2010

Cherry, Brian Wilson, Polymer surfaces, New York : Cambridge University Press, 1981

Additional required materials: none

Course description: Covers characterization of surfaces and interfaces; surface functionalization techniques, characterization of rheological properties of materials using capillarity; characterization of porous materials; atomic force microscopy of surfaces; effects of surfactants and surface adsorption of chemicals; characterization adsorption kinetics and transport properties of porous materials; surface effects on processing of fibers.

Prerequisites: Junior standing in engineering or science.

Co-requisite: MSE 4580

This is a required course.

Specific goals for the course:
1. To introduces students to surface phenomena with a focus on science and engineering of composite materials.
2. To provide the fundamentals of interfacial phenomena needed to understand the challenges in materials processing and manufacturing.
3. To embrace thermodynamics of surfaces, physics of adhesion, wetting, finishing, coating, and chemical and physical deposition of materials onto surfaces and porous materials.
4. To emphasize the role of surface physics in understanding interactions of liquids and chemicals with materials used in composite manufacturing.

Student Learning Outcomes:
The student will be able to:
- explain the types of interfacial phenomena in materials processing and manufacturing.
- display knowledge of thermodynamics of surfaces, adhesion, wetting, finishing, and coating.

Surface Phenomena in Materials Science and Engineering Laboratory
MSE 4600

- relate surface properties to interactions of liquids and chemicals with fibers and fibrous materials.

Criterion 3 outcomes:
The course addresses the following outcomes listed in Criterion 3:

(b) An ability to design and conduct experiments, as well as to analyze and interpret data.

(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Tentative schedule:

Date:	**Experiment**	**Lab Reports due week of:**
Week 1	Image analysis with Matlab	
Week 2	Pendant Drop 1	
Week 3	Pendant Drop. 2	Lab report #1
Week 4	Interfacial tension of liquid pairs	Lab report #2
Week 5	Surfactants with Pendant Drop	Lab report #3
Week 6	Dynamic surface tension with surfactants	Lab report #4
Week 7	Sessile Drop – contact angle	
Week 8	Silanization of surfaces–	Lab report #5
Week 9	Sessile drop with functionalized surfaces	
Week 10	Block-copolymers, sculptured surfaces	

Surface Phenomena in Materials Science and Engineering Laboratory
MSE 4600

Week 11	Sessile drop with functionalized surfaces	Lab report #6
Week 12	Dynamic Contact Angle	Lab report #7
Week 13	Viscosity	Lab report #8
Week 14	Wicking of resins into fabrics	Lab Report #9
Week 15	Wicking of resins into nanoporous alumina membranes and nanofiber webs	

1. Title Page.....5%
2. Abstract.....5%
3. Introduction..... 15%
4. Experimental Procedure..... 10%
5. Results and Discussions..... 35%
    a. Sample Calculations when needed..... 5% of 35%
6. Conclusion.....5%
7. References.....2%
8. Appendices.....3%
9. Answers to Questions..... 20%

ATTENDANCE POLICY

Attendance is expected and required. Tardiness may be counted as absence unless corrected. Students are responsible for any missing class info due to absence. Any in-class work missed due to absence may not be made up.

- If you miss **three or more classes**, which are unexcused, the instructor may drop you.

CLASS PARTICIPATION

- Ask questions ANYTIME during class; we are all here to learn.
- It is requested that general questions regarding course content be posed DURING class hours; this is beneficial for all.

- Special problems of personal, interpretive or argumentative nature should be addressed during office hours.

PROTOCOL SPECIALS

- Should the instructor be more than 15 minutes late, class is automatically dismissed.
- Make-up arrangements will be made during the following class period.
- In the event the instructor must be absent because of an emergency or travel, make-up or substitute arrangements will be made.

REQUIRED STATEMENTS:

Assessability Statement: (Taken from Clemson University Academic Policy):

Clemson University values the diversity of our student body as a strength and a critical component of our dynamic community. Students with disabilities or temporary injuries/conditions may require accommodations due to barriers in the structure of facilities, course design, technology used for curricular purposes, or other campus resources. Students who experience a barrier to full access to this class should let the professor know, and make an appointment to meet with a staff member in Student Accessibility Services as soon as possible. You can make an appointment by calling 864-656-6848, by emailing studentaccess@lists.clemson.edu, or by visiting Suite 239 in the Academic Success Center building. Appointments are strongly encouraged – drop-ins will be seen if at all possible, but there could be a significant wait due to scheduled appointments. Students who receive Academic Access Letters are strongly encouraged to request, obtain and present these to their professors as early in the semester as possible so that accommodations can be made in a timely manner. It is the student's responsibility to follow this process each semester. You can access further information here: http://www.clemson.edu/campus-life/campus-services/sds/.

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Examinations: "The standing of a student in his/her work at the end of a semester is based upon daily classwork, tests or other work, and final examinations. "

Posting of Grades: "The United States Family Educational Rights and Privacy Act prohibit the public distribution of grades or graded work. This is commonly understood to include posting grades by student names, initials, or student social security number. It is also understood to include placing of graded material in a public place where students go through the material to find their own graded work."

Emergency procedures: "Emergency procedures have been posted in all buildings and on all elevators. Students should be reminded to review these procedures for their own safety."

Copyright Statement: Materials in some of the courses are copyrighted. They are intended for use only by students registered and enrolled in a particular course and only for instructional activities associated with and for the duration of the course. They may not be retained in another medium or disseminated further. They are provided in compliance with the provisions of the Teach Act. Students should be reminded to refer to the Use of Copyrighted Materials and "Fair Use Guidelines" policy on the Clemson University website for additional information: http://www.lib.clemson.edu/copyright/.

Relationship of course to program objectives: Department of MSE Educational Objectives: a and e.

000117

Add 4000/6000 Course

Course Attributes

Subject Abbreviation: ECE-Electrical and Comp Engr
Course Number: 4160 / 6160
Effective Term: Spring 2018
College: Engr, Comp, and Appl Sci
Department: Electrical & Computer Engr

Catalog Title: Smart Grid
Transcript Title: Smart Grid
Cross-reference(s):
Grade Mode: Standard Letter

☐ **Additional Fee?**
Justification

Form

User ID: cstrimp **Name:** Courtney Honeycutt
Date: 03/13/2017 **Number:** 28410

Hours

Fixed Credit Course

Credit Hrs	Contact Hrs
3	3

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	Max	Min	Max

Rationale for Add Course

- ☐ Strengthen Program Requirement(s)
- ☐ Alignment of Student Learning Outcomes
- ☐ Alternative Delivery of Content
- ☐ Improve Time to Degree
- ☑ Evolution of the Discipline
- ☐ Changing Prerequisites
- ☐ Address DWF Rates
- ☐ General Education Modifications
- ☑ Other (Please specify.)

This course has been offered 3 times as a special topics course (as of Spring 2017), and now needs a permanent number.

Schedule Types

- ○ Field Course
- ○ Independent Study
- ○ Internship
- ○ Lab No Fee
- ○ Lab With Fee
- ◉ Lecture
- ○ Other
- ○ Seminar
- ○ Studio
- ○ Tutorial

Projected Enrollment

Year 1: 10
Year 2: 10
Year 3: 15
Year 4: 15

Evaluation

4000

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Assignments (a minimum of 6 assignments and no more than 8): 20%
Discussions (in live class and offline): 5%
Project (Team based, no more than 4 students): 25%
Tests (two, can include quizzes): 30%
Final Exam (comprehensive coverage of course content): 20%

6000

A	90	-	100
B	80	-	89
C	70	-	79
F	<		70

Assignments (a minimum of 6 assignments and no more than 8): 10%
Discussions (in live class and offline): 5%
Project (Team based, no more than 2 students): 35%
Tests (three, can include quizzes): 30%
Final Exam (comprehensive coverage of course content): 20%

Catalog Description
This introductory course on smart grid covers the concepts and technologies that transform the traditional power system into an intelligent power system (which is referred to as the smart grid today). The technologies needed for this transformation are of interdisciplinary nature and are introduced in this course.

Statement of need and justification based on assessment of student learning outcomes
This course on smart grid introduces and exposes our students to the modern power systems - the smart grid. In one course, the interdisciplinary nature and concept of the smart grid is introduced. More details in the syllabus.

Textbook(s)
J. Momoh, Smart Grid: Fundamentals of Design and Analysis, Hoboken, NJ:
Wiley, 2012. ISBN: 978-0-470-88939-8.

Learning Objectives
The objectives of the ECE 4160 course are to enable undergraduate students to:
- Apply the interdisciplinary concepts and smart grid technologies learned from this course to design a modern power system, the next generation intelligent grid which is a system of systems.
- Differentiate a traditional power system from an intelligent power grid.
- Be able to contribute to the transformation of a traditional power system into an intelligent power grid.

The objectives of the ECE 6160 course are to enable graduate students to:
- Apply the interdisciplinary concepts and smart grid technologies learned from this course to design a modern power system, the next generation intelligent grid which is a system of systems.
- Differentiate a traditional power system from an intelligent power grid.
- Be able to think through the A to Z process needed to transform a traditional power system into an intelligent power grid.
- Implement an intelligent power grid.

Topical Outline
The course specifically will cover the following topics:

Week #1: Introduction and the traditional power system
Week #2: Smart grid architectures
Week #3 & 4: Intelligent measurements
Week #5: Intelligent communication systems
Week #6: Renewable energy sources
Week #7: Electric vehicles
Week #8: Intelligent power electronics
Week #9 & 10: Computational technologies
Week #11: Cyber security
Week #12: Demand response management
Week #13 &14: Data and Visual Analytics
Week #15: Performance and Economic Analysis

Add course requirements for 6000-level courses
Additional work for the 6000-level course will be in the form of a team-based project with a smaller group than the 4000 level section (i.e., more work for the individual students) and an additional test. See evaluation section above.

Syllabus
Upload File: ECE_4160_6160_Syllabus_revised-20170105122928.doc

Carl Baum 2/22/17
Chair, Department Curriculum Committee Date

David L. Noneaker 2/22/17
Department Chair Date

Christopher Kitchens 3/17/2017
Chair, College Curriculum Committee Date

Bradley Putman 3/18/17
College Dean Date

Director, Calhoun Honors College Date

John D. Wiffi 4/7/2017
Chair, Undergraduate Curriculum Committee Date

Chair, Graduate Curriculum Committee Date

Robert W. Jones 9/24/17
Provost Date

ELECTRICAL AND COMPUTER ENGINEERING DEPARTMENT
CLEMSON UNIVERSITY

ECE 4160/6160 - SMART GRID

INSTRUCTOR: G. Kumar Venayagamoorthy, PhD, MBA, FIET, FSAIEE
Duke Energy Distinguished Professor of Electrical and Computer Engineering
Director of the Real-Time Power and Intelligent Systems Laboratory
Riggs 303D
Tel. 864 656-5936
gvenaya@clemson.edu

SEMESTER: Spring 20XX

REQUIRED TEXT: J. Momoh, *Smart Grid: Fundamentals of Design and Analysis*, Hoboken, NJ: Wiley, 2012. ISBN: 978-0-470-88939-8.

REFERENCES:
1. S.F. Bush, *Smart Grid: Communication-Enabled Intelligence for the Electric Power Grid*, West Sussex, United Kingdom: Wiley, 2014. ISBN: 978-1-119-97580-9.
2. J. Ekanayake, K. Liyanage, J. Wu, A. Yokoyama, and N. Jenkins, "*Smart Grid: Technology and Applications*", West Sussex, United Kingdom: Wiley, 2012. ISBN: 978-0-470-97409-4
3. Papers from IEEExplore and Sciencedirect databases.
4. Guest Lectures

5. Additional material may be provided by the instructor.

COURSE OBJECTIVES:

The objectives of the ECE 4160 course are to enable undergraduate students to:

- Apply the interdisciplinary concepts and smart grid technologies learned from this course to design a modern power system, the next generation intelligent grid which is a system of systems.
- Differentiate a traditional power system from an intelligent power grid.
- Be able to contribute to the transformation of a traditional power system into an intelligent power grid.

The objectives of the ECE 6160 course are to enable graduate students to:

- Apply the interdisciplinary concepts and smart grid technologies learned from this course to design a modern power system, the next generation intelligent grid which is a system of systems.
- Differentiate a traditional power system from an intelligent power grid.
- Be able to think through the A to Z process needed to transform a traditional power system into an intelligent power grid.
- Implement an intelligent power grid.

COURSE DESCRIPTION: This introductory course on smart grid covers the concepts and technologies that transform the traditional power system into an intelligent power system (which is referred to as the smart grid today). The technologies needed for this transformation are of interdisciplinary nature and are introduced in this course.

The course specifically will cover the following topics:

Week #1: Introduction and the traditional power system

Week #2: Smart grid architectures
Week #3 & 4: Intelligent measurements
Week #5: Intelligent communication systems
Week #6: Renewable energy sources
Week #7: Electric vehicles
Week #8: Intelligent power electronics
Week #9 & 10: Computational technologies
Week #11: Cyber security
Week #12: Demand response management
Week #13 &14: Data and Visual Analytics
Week #15: Performance and Economic Analysis

PRE-REQUISITES: The basic requirement is a senior undergraduate standing with MATLAB and other programming language capabilities, Microsoft Office skills (word, presentation and spreadsheet) and creation of PDF documents.

GRADING: The grading requirements are different for the undergraduate (UG) and graduate students (G).

Assignments: a minimum of 6 assignments and no more than 8
- UG 20%
- G 10%

Discussions (in-class and offline): 5%

Project (Team based):
- UG: no more than 4 students 25%
- G: no more than 2 students 35%

Tests (include quizzes): 30%
- UG (two tests)
- G (three tests)

An additional test for graduate students will be conducted.

Final Exam (comprehensive coverage of course content): 20%

Grades:

- UG: A – 90% - 100%; B – 80 to < 90%; C – 70 to <80%; D – 60 to < 70%; & F – < 60%
- G: A – 90% - 100%; B – 80 to < 90%; C – 70 to <80%; & F – < 70%

All disputes about an evaluation of any graded work during the semester must be submitted in writing (typed, not handwritten) within one week after an assignment, test or project has been distributed to students in the class. Any grade challenges must provide specific justifications for why the grade would be changed.

ATTENDANCE: Regular class attendance and participation in discussions is expected with attendance taken as iROAR requires entry of student's last date of class attendance. Students are responsible for all material covered and assigned readings during the semester. If you anticipate not being able to attend a class for a particular reason, please e-mail me with the information (before the class to

be missed). The optimal classroom learning experience depends on both a professional teaching environment and student participation.

TESTS AND FINAL EXAM: Absence from the tests/final exam will be excused only for medical reasons or serious immediate family problems. A student who anticipates missing a test/exam for legitimate university or professional activities shall discuss with the instructor at least one week prior and set up an alternative arrangement to have test taken before the intended date.

ASSIGNMENT/ HOMEWORK: It is anticipated that there will be at least five assignments and no more than ten. Assignment shall be submitted by email no later than **11.55 pm of the posted due date**. No late assignment beyond five days will be accepted. Late assignments require approval of the instructor and may be subjected to a 10% loss of points/day. Any homework assigned will not be required for submission but they are mandatory readings. Quizzes and class discussions may be based on homework (missed quizzes will have no make-ups).

MEETING DEADLINES: Plan ahead for the unexpected! You are accountable for staying on schedule should technological or other problems arise. You should immediately contact the instructor if an emergency may affect your ability to meet course deadlines. Do not fall behind. Playing catch-up causes stress, and stress hinders learning.

PROJECT WORK: There will be a group project. The projects will require written reports in IEEE PES paper format consisting of the following items:

- Title
- Abstract
- Introduction and motivation to the project topic with references (use the IEEE bibliography format)
- Concept/Methodology
- Description of concept in implementation (flowcharts, algorithms and/or programs)
- Discussions on the findings and/or results
- Summary (including future work).

Page length: Eight pages.

TEST/FINAL EXAM DATES (*tentative days):

***First Test:**	TBA
***Second Test:**	TBA
***Third Test** (graduate students only):	TBA
Final Examination:	TBA

ACADEMIC INTEGRITY:
The following is Clemson's official statement on academic integrity:

"As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a 'high seminary of learning.' Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form. In instances where academic standards may have been compromised, Clemson University has a responsibility to respond appropriately and expeditiously to charges of violations of academic integrity."

Please refer to the graduate academic integrity policy, approved March 26, 2007 by the Provost's Advisory Council, at http://gradspace.editme.com/AcademicGrievancePolicyandProcedures#integritypolicy.

Each student should read this policy annually to be apprised of this critical information.

STUDENTS WITH DISABILITIES:
"*It is University policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have disabilities. Students are encouraged to contact Student Disability Services to discuss their individual needs for accommodation.*" Any student with an official Clemson University recognized learning disability must inform the instructor within the first week of class meetings so that arrangements can be made to meet the student's needs. Details on policies and procedures are available at www.clemson.edu/sds.

CLEMSON UNIVERSITY TITLE IX STATEMENT (Undergraduate Students)
Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity (e.g., opposition to prohibited discrimination or participation in any complaint process, etc.) in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This policy is located at http://www.clemson.edu/campus-life/campus-services/access/title-ix/. Mr. Jerry Knighton is the Clemson University Title IX Coordinator. He also is the Director of Access and Equity. His office is located at 111 Holtzendorff Hall, 864.656.3181 (voice) or 864.565.0899 (TDD).

CLEMSON UNIVERSITY TITLE IX STATEMENT (Graduate Students)
The Clemson University Title IX (Sexual Harassment) statement: Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity (e.g., opposition to prohibited discrimination or participation in any complaint process, etc.) in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. The policy is located at http://www.clemson.edu/campus-life/campus-services/access/non-discrimination-policy.html. Jerry Knighton serves as Clemson's Title IX coordinator and he may be reached at knightl@clemson.edu or 656-3181.

COPYRIGHT STATEMENT:
Materials in some of the courses are copyrighted. They are intended for use only by students registered and enrolled in a particular course and only for instructional activities associated with and for the duration of the course. They may not be retained in another medium or disseminated further. They are provided in compliance with the provisions of the Tech Act. Students should be reminded to refer to the Use of Copyrighted Materials and "Fair Use Guidelines" policy on the Clemson University website. Additional information is detailed at http://libguides.clemson.edu/copyright.

FINAL CONSIDERATIONS:

Learning:
At the end of the day it is how much you have learned from this course that matters. You are advised to be active course participant so that you will receive feedback to assist you with your learning and maximize your throughput.

Changes:
Any portion of this syllabus may be changed during the semester by the instructor as needed. You will be notified as soon as possible.

Agreement:
If you disagree with any of the policies or procedures stated above or cannot accommodate the time and work requirements of the course, you need to drop the course as soon as possible. By continuing, you agree to comply with all the policies and procedures described in the course syllabus.

EMERGENCY PROCEDURES:
Emergency procedures have been posted in all buildings and on all elevators. Students should review these procedures for their own safety on a regular basis and be aware of them at all times.

Add 4000/6000 Course

000124

Course Attributes

Subject Abbreviation: ECE-Electrical and Comp Engr
Course Number: 4310 / 6310
Effective Term: Fall 2017
College: Engr, Comp, and Appl Sci
Department: Electrical & Computer Engr

Catalog Title: Introduction to Computer Vision ☐ **Additional Fee?**
Transcript Title: Intro to Computer Vision Justification
Cross-reference(s):
Grade Mode: Standard Letter

Form

User ID: cstrimp **Name:** Courtney Honeycutt
Date: 03/13/2017 **Number:** 29832

Hours

Fixed Credit Course

Credit Hrs	Contact Hrs
3	3

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	Max	Min	Max

Rationale for Add Course

- ☐ Strengthen Program Requirement(s)
- ☐ Alignment of Student Learning Outcomes
- ☐ Alternative Delivery of Content
- ☐ Improve Time to Degree
- ☑ Evolution of the Discipline
- ☐ Changing Prerequisites
- ☐ Address DWF Rates
- ☐ General Education Modifications
- ☑ Other (Please specify.)

The course has been offered 3 times as a special topics course, and now needs a permanent number.

Schedule Types

- ○ Field Course
- ○ Independent Study
- ○ Internship
- ○ Lab No Fee
- ○ Lab With Fee
- ◉ Lecture
- ○ Other
- ○ Seminar
- ○ Studio
- ○ Tutorial

Projected Enrollment

Year 1: 20
Year 2: 25
Year 3: 25
Year 4: 25

Evaluation

4000				6000			
A	90	-	100	A	90	-	100
B	80	-	89	B	80	-	89
C	70	-	79	C	70	-	79
D	60	-	69	F	<		70
F	<		60				

100% eight assignments (12.5% each)

80% eight assignments (10% each), 20% semester project

Catalog Description

The purpose of a computer vision system is to take data (usually in the form of one or more images) and produce information.This course teaches the mainstream theories of computer vision used to build such systems. Several examples (such as optical character recognition) are implemented in assignments.

Statement of need and justification based on assessment of student learning outcomes

Historically computer vision was an advanced research topic with instruction reserved for 8000-level. Its main theories have now stabilized and become prominently used in many industries. This 4000/6000 level elective prepares undergraduates and graduates for engineering work using those main theories.

Textbook(s)

Image Processing, Analysis, and Machine Vision, by Sonka, Hlavac and Boyle, third edition, Cengage Learning, 2007.
Alternate: Computer Vision: Algorithms and Applications, by Szeliski, Springer, 2011.
Alternate: Computer Vision, by Shapiro and Stockman, Prentice Hall Publishing, 2001.

Learning Objectives

Students will be able to apply mainstream computer vision theories in the engineering (design, implementation, testing and debugging) of modern devices and systems.

Graduate students will additionally be ready to apply computer vision to advanced research problems within the focus areas of intelligent systems and computer systems architecture.

Topical Outline

Machine vision sensors and paradigms (1 week)
Image processing basics (histograms, smoothing, convolution, edge detection) (2 weeks)
GUI event-driven programming (1.5 weeks)
Segmentation, region properties and algorithms (2 weeks)
Matched filters, ROC curves and evaluation (2 weeks)
Active contours (snakes), energy minimization (1.5 weeks)
Tsai's camera calibration model and method, system latency (2 weeks)
Accelerometers and gyroscopes, motion data, activity recognition (1 week)
Object modeling and recognition (1 week)
Range cameras, 3D data, and surface segmentation (1 week)

Add course requirements for 6000-level courses

Additional semester long project that will count as 20% of the students' grade. The semester project is different each year. Topic is provided approximately week 5. Grading determined by demonstration at end of semester along with written report that includes performance analysis.

Syllabus

Upload File: syllabus-2017-20170221145553.doc

Carl Baum — 2/22/17
Chair, Department Curriculum Committee — Date

David L. Noneaker — 2/22/17
Department Chair — Date

Christopher Kitchens — 3/17/2017
Chair, College Curriculum Committee — Date

Bradley Pitman — 3/18/17
College Dean — Date

Director, Calhoun Honors College — Date

John D. Wiffin — 4/7/2017
Chair, Undergraduate Curriculum Committee — Date

Chair, Graduate Curriculum Committee — Date

Robert W. Jones — 8/24/17
Provost — Date

President — Date

ECE 4310/6310-001 Introduction to Computer Vision
Fall 2017

Course Objective

The purpose of a computer vision system is to take data (usually in the form of one or more images) and produce information. For example, a computer vision system might inspect bottles for proper volumes, identify abnormal tissue in a medical image, recognize a fingerprint to allow entry to a building, or tell an automated door when it is safe to close. This course teaches the mainstream theories of computer vision used to build such systems. Several examples (such as optical character recognition) are implemented in assignments.

Learning Objective

Students will be able to apply mainstream computer vision theories in the engineering (design, implementation, testing and debugging) of modern devices and systems.

Graduate students will additionally be ready to apply computer vision to advanced research problems within the focus areas of intelligent systems and computer systems architecture.

Suggested Text

Image Processing, Analysis, and Machine Vision, by Sonka, Hlavac and Boyle, third edition, Cengage Learning, 2007.
Alternate: Computer Vision: Algorithms and Applications, by Szeliski, Springer, 2011.
Alternate: Computer Vision, by Shapiro and Stockman, Prentice Hall Publishing, 2001.
We will make use of journal papers and other sources throughout the semester.
The course web site is http://www.ces.clemson.edu/~ahoover/ece493/.

Class location/time

Tuesday/Thursday 11:00 am - 12:15 pm, Riggs 301

Professor

Dr. Adam Hoover
313A Riggs Hall
656-3377
ahoover@clemson.edu
office hours walk-in anytime, or by appointment

Topics

Machine vision sensors and paradigms (1 week)
Image processing basics (histograms, smoothing, convolution, edge detection) (2 weeks)
GUI event-driven programming (1.5 weeks)
Segmentation, region properties and algorithms (2 weeks)
Matched filters, ROC curves and evaluation (2 weeks)
Active contours (snakes), energy minimization (1.5 weeks)
Tsai's camera calibration model and method, system latency (2 weeks)
Accelerometers and gyroscopes, motion data, activity recognition (1 week)
Object modeling and recognition (1 week)
Range cameras, 3D data, and surface segmentation (1 week)

Grading

ECE4930: 100% eight assignments (12.5% each)
ECE6930: 80% eight assignments (10% each), 20% semester project
Standard decade grading (90-100=A, etc.)
UG: 90-100 = A
80-89 = B
70-79 = C
60-69 = D
<60 = F
GR: 90-100 = A
80-89 = B
70-79 = C
<70 = F

The semester project is different each year. Topic is provided approximately week 5. Grading determined by demonstration at end of semester along with written report that includes performance analysis.

Attendance policies

Attendance is not required nor is used as part of grading. However, due to the nature of the material being taught, students should not expect to be able to complete the lab work without attending the lectures to learn what to do. The on-line materials provided at the course website should be considered supplements and not replacements for in-class instructions.

Academic Integrity

Undergraduate:
"As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a high seminary of learning. Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form."

Graduate:
"An academic environment of integrity is one in which students, faculty and staff interact with each other from a position of mutual trustworthiness. As a member of the consortium of institutions comprising the International Center for Academic Integrity, Clemson University has committed itself to preparing a community of scholars dedicated to integrity in teaching, research, scholarship, mentorship and the acquisition and display of professional values of trust, honesty, fairness, responsibility, respect, and courage. It is an expectation that Clemson graduate students avail themselves of the many opportunities and resources both on and off campus to learn how to engage in professional practice with integrity. The Graduate School and the community of scholars engaged in graduate-level education will respond vigorously and expeditiously to charges of violations of academic integrity."

Title IX

Title IX (Sexual Harassment) Statement Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity (e.g., opposition to prohibited discrimination or participation in any complaint process, etc.) in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This policy is located at http://www.clemson.edu/campus-life/campus-services/access/title-ix/. Mr. Jerry Knighton is the

Clemson University Title IX Coordinator and is also the Director of Access and Equity. His office is located at 111 Holtzendorrf Hall, 864.656.3181 (voice) or 864.565.0899 (TDD).

Students with Disabilities

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Change Undergraduate Course

Change a Course

Subject:	ECE-Electrical and Comp Engr
Number:	4370
Effective Term:	Fall 2017
Title:	Microelectromechanical Systems
Honors Course:	
☐ Add Honors Course:	
Last Term Course was taught:	201601

Brief Statement of Change Based on Assessment Results:
The course material requires students to have completed all junior level coursework and below.

Rationale for Changing a Course

- ☐ Strengthen Program Requirement(s)
- ☐ Alignment of Student Learning Outcomes
- ☐ Alternative Delivery of Content
- ☐ Improve Time to Degree
- ☐ Evolution of the Discipline
- ☑ Changing Prerequisites
- ☐ Address DWF Rates
- ☐ General Education Modifications
- ☐ Other (Please specify.)

☑ Change Prerequisite(s) / Corequisite(s)

From	CH 1020 and PHYS 1220
To	CH 1020, PHYS 1220, and senior status.

Form

User ID:	cstrimp	Name:	Courtney Honeycutt
Date:	01/25/2017	Number:	29133

000130

Carl Baum — 2/22/17
Chair, Department Curriculum Committee — Date

David L. Nowack — 2/22/17
Department Chair — Date

Christopher Kitchens — 3/17/2017
Chair, College Curriculum Committee — Date

Bradley Putman — 3/18/17
College Dean — Date

Director, Calhoun Honors College — Date

John D. Kelly — 4/7/2017
Chair, Undergraduate Curriculum Committee — Date

Chair, Graduate Curriculum Committee — Date

Robert A. Jones — 3/24/17
Provost — Date

President — Date

000131

Change Undergraduate Course

Change a Course

Subject:	ENGR-Engineering
Number:	1050
Effective Term:	Summer 2017
Title:	Engr Discipline & Skills I
Honors Course:	
☐ Add Honors Course:	
Last Term Course was taught:	201608

Brief Statement of Change Based on Assessment Results:
Changing course from stand alone lab course to lecture course.

Rationale for Changing a Course

- ☐ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☑ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

☑ Change Schedule Type

From	To
○ Field Course	○ Field Course
○ Independent Study	○ Independent Study
○ Internship	○ Internship
○ Lab No Fee	○ Lab No Fee
◉ Lab With Fee	○ Lab With Fee
○ Lecture	◉ Lecture
○ Other	○ Other
○ Seminar	○ Seminar
○ Studio	○ Studio
○ Tutorial	○ Tutorial

☑ Change of Credit

From
Fixed Credit Course

Credit Hrs	Contact Hrs
1	2

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	Max	Min	Max

To
Fixed Credit Course

Credit Hrs	Contact Hrs
1	1

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	Max	Min	Max

Learning Objectives

1. Identify fundamental dimensions, base units, and named derived dimensions and units
2. Apply laws governing dimensions, units, and equation development
3. Express observations in appropriate units and perform conversions between unit systems
4. Define, recall, and utilize basic mathematical and physical sciences principles, including but not limited to: amount, density, efficiency, electrical concepts, energy, force, mass, power, pressure, temperature and weight

000132

Topical Outline

Module 1: Foundational Engineering Concepts [1]
- Fundamental Dimensions and Base Units
- Basic Conversion Procedures

Module 2: Problem Solving involving Conversions [3]
- Equations involving Unit Conversions
- Density
- Force
- Weight

Module 3: Problem Solving involving Equations [3]
- Derived Dimensions and Units
- Equation Laws
- Pressure (hydrostatic, total)
- Temperature Equations

Module 4: Problem Solving with Initial and Final Conditions [1]
- Amount
- Ideal Gas

Module 5: Problem Solving with Conservation Laws [3]
- Kinetic Energy
- Potential Energy
- Thermal Energy
- Temperature Ratios
- Work

Module 6: Problem Solving with Rate and Loss [2]
- Power
- Efficiency

Module 7: Problem Solving with Dynamic Systems [2]
- Charge
- Current
- Resistance
- Voltage

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Assignments = 10%
Exam 1 = 40%
Exam 2 = 50%

Syllabus

Upload File: ENGR 1050 Syllabus-20170306132108.pdf

Description: ENGR 1050 Syllabus

Form

User ID: jminor **Name:** John Minor
Date: 03/16/2017 **Number:** 30119

000133

3/8/2017
Date

Chair, Department Curriculum Committee

3/8/17
Date

Department Chair

Christopher Kitchens 3/17/2017
Date

Chair, College Curriculum Committee

Bradley Pitman 3/18/17
Date

College Dean

Date

Director, Calhoun Honors College

4/7/2017
Date

Chair, Undergraduate Curriculum Committee

Date

Chair, Graduate Curriculum Committee

8/24/17
Date

Provost

Date

President

000134

Change Undergraduate Course

Change a Course

Subject:	ENGR-Engineering
Number:	1060
Effective Term:	Summer 2017
Title:	Engr Discipline & Skills II

Honors Course:

☐ Add Honors Course:

Last Term Course was taught: 201701

Brief Statement of Change Based on Assessment Results:
Changing course from stand alone lab to lecture course.

Rationale for Changing a Course

- ☐ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☑ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

☑ **Change Schedule Type**

From	To
○ Field Course	○ Field Course
○ Independent Study	○ Independent Study
○ Internship	○ Internship
○ Lab No Fee	○ Lab No Fee
◉ Lab With Fee	○ Lab With Fee
○ Lecture	◉ Lecture
○ Other	○ Other
○ Seminar	○ Seminar
○ Studio	○ Studio
○ Tutorial	○ Tutorial

☑ **Change of Credit**

From
Fixed Credit Course

Credit Hrs	Contact Hrs
1	2

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	Max	Min	Max

To
Fixed Credit Course

Credit Hrs	Contact Hrs
1	1

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	Max	Min	Max

Learning Objectives

1. Create "proper" plots of experimental and theoretical data
2. Determine graphical solutions to problems, with special emphasis on economic breakeven analysis
3. Identify a linear, power and exponential mathematical models from an equation form and a graphical sketch
4. Interpret mathematical models in terms of physical phenomena
5. Evaluate a logarithmic plot to determine an appropriate mathematical model to describe experimental data
6. Use Microsoft Excel to:

a. enter data and text
b. format information
c. write basic mathematical formulas
d. use absolute, relative, and mixed cell addressing
e. utilize built-in functions, including mathematical, statistical, trigonometric and LOOKUP
f. create conditional statements
g. apply conditional formatting, data validation, sorting and filtering to a worksheet
h. create proper plots of experimental and theoretical data
i. model experimental data with a trendline
j. create logarithmic plots

000135

Topical Outline

Module 1: Foundational Engineering Concepts [2]
- Basic Excel Workbook
- Cell References
- Built-in Excel Functions

Module 2: Automation of Problem Solving [2]
- Conditionals in Excel

Module 3: Interaction of Engineering Tools [3]
- LOOKUP functions in Excel
- Conditional Formatting in Excel
- Data Validation
- Sort and Filter

Module 4: Graphical Representation [2]
- Proper Plots
- Graphing in Excel
- Trendlines in Excel

Module 5: Model Interpretation [2]
- Exponential Models
- Linear Models
- Power Law Models

Module 6: Model Development [2]
- Logarithmic Plots (log-log, semilog)

Module 7: Graphical Interpretation [2]
- Graphical Solutions
- Breakeven Analysis

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Assignments = 10%
Exam 1 = 20%
Exam 2 = 20%
Final Exam = 50%

Syllabus

Upload File: ENGR 1060 Syllabus-20170306154737.pdf

Description: ENGR 1060 Syllabus

Form

User ID: jminor **Name:** John Minor
Date: 03/06/2017 **Number:** 30131

Jonathan Maier 3/6/2017
Chair, Department Curriculum Committee Date

3/6/17
Department Chair Date

Christopher Kitchens 3/17/2017
Chair, College Curriculum Committee Date

Bradley Putman 3/18/17
College Dean Date

000136

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date 4/7/2017

Chair, Graduate Curriculum Committee — Date

Provost — Date 8/24/17

President — Date

000137

Change Undergraduate Course

Change a Course

Subject:	ENGR-Engineering
Number:	1070
Effective Term:	Summer 2017
Title:	Programming & Prob Solving I

Honors Course:

☐ Add Honors Course:

Last Term Course was taught: 201608

Brief Statement of Change Based on Assessment Results:
Changing course from a stand alone lab course to a lecture course

Rationale for Changing a Course

- ☐ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☑ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

☑ **Change Schedule Type**

From	To
○ Field Course	○ Field Course
○ Independent Study	○ Independent Study
○ Internship	○ Internship
○ Lab No Fee	○ Lab No Fee
◉ Lab With Fee	○ Lab With Fee
○ Lecture	◉ Lecture
○ Other	○ Other
○ Seminar	○ Seminar
○ Studio	○ Studio
○ Tutorial	○ Tutorial

☑ **Change of Credit**

From
Fixed Credit Course

Credit Hrs	Contact Hrs
1	2

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	Max	Min	Max

To
Fixed Credit Course

Credit Hrs	Contact Hrs
1	1

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	Max	Min	Max

Learning Objectives

1. Create, save and execute a program
2. Use MATLAB to:
a. enter data in the form of scalars, vectors, and matrices;
b. enter text in the form of character strings; and
c. enter mixed data in the form of cell arrays
d. write basic mathematical formulas
e. utilize built-in functions, including mathematical, statistical, trigonometric
f. create conditional statements
g. apply error and warning statements
3. Allow MATLAB to exchange data with...:
a. a user, through input/menu and formatted output (fprintf/sprintf) statements
b. another MATLAB program, using user-defined functions
c. a text file, using save / load
d. an Excel workbook, using xlsread / xlswrite
4. Analyze and interpret data to formulate a solution to an engineering problem, utilizing code containing:
a. input from a user, text file, or Excel workbook;
b. formatted output to the Command Window, a text file, or Excel workbook;
c. conditional statements, including error and warning messages;

000138

Topical Outline

Module 1: Foundational Engineering Concepts – Data Structures [1]
- Scalars
- Vectors
- Matrices

Module 2: Foundational Engineering Concepts – Basic Programs & More Data Structures [2]
- MATLAB interface
- Assignment operator
- Dot operator
- Create, run and save a program

Module 3: Foundational Engineering Concepts – Data Structures [2]
- Character Strings
- Cell Arrays

Module 4: Interaction of Engineering Tools – User [2]
- input
- menu
- fprintf
- sprintf

Module 5: Interaction of Engineering Tools – other programs [2]
- User-defined functions

Module 6: Interaction of Engineering Tools –MAT files and Excel [2]
- load
- save
- xlsread
- xlswrite

Module 7: Automation of Problem Solving – Conditionals [3]
- Relational operators
- Logical operators
- Conditional statements

Module 8: Interaction of Engineering Tools – Data Validation [1]
- Errors
- Warnings

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Assignments = 5%
Midterm Exam = 40%
Final Exam = 55%

Syllabus

Upload File: ENGR 1070 Syllabus-20170306155603.pdf

Description: ENGR 1070 Syllabus

Form

User ID: jminor **Name:** John Minor
Date: 03/06/2017 **Number:** 30134

3/6/2017
Date
Chair, Department Curriculum Committee

3/6/17
Date
Department Chair

Christopher Kitchens 3/17/2017

000139

Chair, College Curriculum Committee

Date

Bradley Pitman 3/18/17

College Dean

Date

Date

Director, Calhoun Honors College

John D. Kniffin 4/7/2017

Chair, Undergraduate Curriculum Committee

Date

Date

Chair, Graduate Curriculum Committee

Robert W Jones 8/24/17

Provost

Date

Date

President

000140

Change Undergraduate Course

Change a Course

Subject:	ENGR-Engineering
Number:	1080
Effective Term:	Summer 2017
Title:	Programming & Prob Solving II
Honors Course:	
☐ Add Honors Course:	
Last Term Course was taught:	201605

Brief Statement of Change Based on Assessment Results:
Changing course from stand alone lab course to lecture course

Rationale for Changing a Course

- ☐ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☑ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

☑ Change Schedule Type

From	To
○ **Field Course**	○ **Field Course**
○ **Independent Study**	○ **Independent Study**
○ **Internship**	○ **Internship**
○ **Lab No Fee**	○ **Lab No Fee**
◉ **Lab With Fee**	○ **Lab With Fee**
○ **Lecture**	◉ **Lecture**
○ **Other**	○ **Other**
○ **Seminar**	○ **Seminar**
○ **Studio**	○ **Studio**
○ **Tutorial**	○ **Tutorial**

☑ Change of Credit

From
Fixed Credit Course

Credit Hrs	**Contact Hrs**
1	2

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	**Max**	**Min**	**Max**

To
Fixed Credit Course

Credit Hrs	**Contact Hrs**
1	1

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	**Max**	**Min**	**Max**

Learning Objectives

1. Create, save and execute a program
2. Use MATLAB to:
   a. enter data in the form of scalars, vectors, and matrices;
   b. enter text in the form of character strings; and
   c. enter mixed data in the form of cell arrays
   d. write basic mathematical formulas
   e. utilize built-in functions, including mathematical, statistical, trigonometric
   f. create conditional statements
   g. apply error and warning statements
   h. create proper plots of experimental and theoretical data
   i. model experimental data with a trendline
3. Allow MATLAB to exchange data with...:
   a. a user, through input/menu and formatted output (fprintf/sprintf) statements
   b. another MATLAB program, using user-defined functions
   c. a text file, using save / load
   d. an Excel workbook, using xlsread / xlswrite
4. Analyze and interpret data to formulate a solution to an engineering problem, utilizing code containing:
   a. input from a user, text file, or Excel workbook;
   b. formatted output to the Command Window, a text file, or Excel workbook;
   c. conditional statements, including error and warning messages;
   d. graphs;
   e. mathematical modeling; and
   f. looping structures.

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Topical Outline

Module 9: Graphical Representation – Plotting [3]
- Graphing in MATLAB

Module 10: Graphical Representation – Data [3]
- Trendlines in MATLAB

Module 11: Automation of Problem Solving [3]
- Indefinite Loops (WHILE)

Module 12: Automation of Problem Solving [3]
- Definite Loops (FOR)

Module 13: Advanced Problem Solving [3]
- Combining:
  - input from a user, text file, or Excel workbook;
  - formatted output to the Command Window, a text file, or Excel workbook;
  - conditional statements, including error and warning messages;
  - proper plot rules and creation of graphs in MATLAB;
  - mathematical modeling, including trendline generation for experimental data; and
  - definite and indefinite looping structures

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Assignments = 5%
Midterm Exam = 40%
Final Exam = 55%

Syllabus

Upload File: ENGR 1080 Syllabus-20170306161046.pdf

Description: ENGR 1080 Syllabus

Form

User ID: jminor **Name:** John Minor
Date: 03/06/2017 **Number:** 30137

Chair, Department Curriculum Committee — 3/6/2017 — Date

Department Chair — 3/6/17 — Date

Christopher Kitchens — 3/17/2017 — Date
Chair, College Curriculum Committee

Bradley Putman — 3/18/17 — Date
College Dean

Director, Calhoun Honors College — Date

John D. Kiffi — 4/7/2017 — Date
Chair, Undergraduate Curriculum Committee

000142 Date

Chair, Graduate Curriculum Committee

Robert W Jones 8/24/17

Date

Provost

Date

President

000143

Change Undergraduate Course

Change a Course

Subject:	ENGR-Engineering
Number:	1090
Effective Term:	Summer 2017
Title:	Prog/Problem Solving Apps
Honors Course:	
☐ Add Honors Course:	
Last Term Course was taught:	201605

Brief Statement of Change Based on Assessment Results:
Changing course from stand alone lab course to lecture course

Rationale for Changing a Course

- ☐ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☑ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

☑ Change Schedule Type

From	To
○ **Field Course**	○ **Field Course**
○ **Independent Study**	○ **Independent Study**
○ **Internship**	○ **Internship**
○ **Lab No Fee**	○ **Lab No Fee**
◉ **Lab With Fee**	○ **Lab With Fee**
○ **Lecture**	◉ **Lecture**
○ **Other**	○ **Other**
○ **Seminar**	○ **Seminar**
○ **Studio**	○ **Studio**
○ **Tutorial**	○ **Tutorial**

☑ Change of Credit

From
Fixed Credit Course

Credit Hrs	**Contact Hrs**
1	2

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	**Max**	**Min**	**Max**

To
Fixed Credit Course

Credit Hrs	**Contact Hrs**
1	1

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	**Max**	**Min**	**Max**

Learning Objectives

1. Create, save and execute a program
2. Use MATLAB to:
   a. enter data in the form of scalars, vectors, and matrices;
   b. enter text in the form of character strings; and
   c. enter mixed data in the form of cell arrays
   d. write basic mathematical formulas
   e. utilize built-in functions, including mathematical, statistical, trigonometric
   f. create conditional statements
   g. apply error and warning statements
   h. create proper plots of experimental and theoretical data
   i. model experimental data with a trendline
3. Allow MATLAB to exchange data with…:
   a. a user, through input/menu and formatted output (fprintf/sprintf) statements
   b. another MATLAB program, using user-defined functions
   c. a text file, using save / load
   d. an Excel workbook, using xlsread / xlswrite
4. Analyze and interpret data to formulate a solution to an engineering problem, utilizing code containing:
   a. input from a user, text file, or Excel workbook;
   b. formatted output to the Command Window, a text file, or Excel workbook;
   c. conditional statements, including error and warning messages;
   d. graphs;
   e. mathematical modeling; and
   f. looping structures.

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Topical Outline

Module 1: Foundational Engineering Concepts – Data Structures [1]
- Scalars
- Vectors
- Matrices

Module 2: Foundational Engineering Concepts – Basic Programs & More Data Structures [1]
- MATLAB interface
- Assignment operator
- Dot operator
- Create, run and save a program

Module 3: Foundational Engineering Concepts – Data Structures [1]
- Character Strings
- Cell Arrays

Module 4: Interaction of Engineering Tools – User [1]
- input
- menu
- fprintf
- sprintf

Module 5: Interaction of Engineering Tools – other programs [1]
- User-defined functions

Module 6: Interaction of Engineering Tools –MAT files and Excel [1]
- load
- save
- xlsread
- xlswrite

Module 7: Automation of Problem Solving – Conditionals [2]
- Relational operators
- Logical operators
- Conditional statements
- Errors
- Warnings

Module 8: Graphical Representation – Plotting [1]
- Graphing in MATLAB

Module 9: Graphical Representation – Data [1]
- Trendlines in MATLAB

Module 10: Automation of Problem Solving [2]
- Indefinite Loops (WHILE)

Module 11: Automation of Problem Solving [3]
- Definite Loops (FOR)
- Advance problem solving combining
  - input from a user, text file, or Excel workbook;
  - formatted output to the Command Window, a text file, or Excel workbook;
  - conditional statements, including error and warning messages;
  - proper plot rules and creation of graphs in MATLAB;
  - mathematical modeling, including trendline generation for experimental data; and
  - definite and indefinite looping structures

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Project - Part 1 = 40%
Project - Test Cases = 5%
Project - Part 2 = 55%

Syllabus

Upload File: ENGR 1090 Syllabus-20170314140427.pdf

Description: ENGR 1090 Syllabus

000145

Form

User ID: jminor **Name:** John Minor
Date: 03/14/2017 **Number:** 30147

3/14/2017
Chair, Department Curriculum Committee — Date

Department Chair — Date

3/17/2017
Christopher Kitchens
Chair, College Curriculum Committee — Date

3/18/17
Bradley Putman
College Dean — Date

Director, Calhoun Honors College — Date

4/7/2017
Chair, Undergraduate Curriculum Committee — Date

Chair, Graduate Curriculum Committee — Date

8/24/17
Provost — Date

President — Date

000146

Change Undergraduate Course

Change a Course

Subject: DPA-Digital Production Arts

Number: 3071

Effective Term: Fall 2017

Title: Meth 3d Prod Lab

Honors Course:

☐ Add Honors Course:

Last Term Course was taught: 999999

Brief Statement of Change Based on Assessment Results:
Students in
this lab course use the computers in the School of Computing labs, and we want to change the schedule type to a lab with fee to help the fund the equipment replacement schedule for our labs. The lack of a fee was an oversight when this course was first proposed.

Rationale for Changing a Course

- ☐ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☑ **Other (Please specify.)**

Change schedule type to lab with fee.

☑ Change Schedule Type

From	To
○ Field Course	○ Field Course
○ Independent Study	○ Independent Study
○ Internship	○ Internship
◉ Lab No Fee	○ Lab No Fee
○ Lab With Fee	◉ Lab With Fee
○ Lecture	○ Lecture
○ Other	○ Other
○ Seminar	○ Seminar
○ Studio	○ Studio
○ Tutorial	○ Tutorial

Learning Objectives

[provided for information; no change in learning
objectives is intended from the currently approved lab] • Describe the basic steps of the computer-generated (CG) production process. • Sculpt a 3D model from reference images. • Apply texturing techniques to 3D geometries. • Set up character rigs. • Produce character animations. • Light and render a CG production

Topical Outline

[provided for information; no change in the topical
outline is intended from the currently approved lab] Basic steps of the computer-generated (CG) production process (2 weeks). 3D models and sculpting (3 weeks). Texturing techniques (2 weeks). Character rigs (2 weeks). Character animations (4 weeks). Lighting and rendering (2
weeks).

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

[provided
for information; no change in evaluation is intended from the currently approved

000147

lab] Participation/Quizzes: 5%. Professionalism: 5%. Weekly drafts: 60%. Final film: 30%.

Syllabus

Upload File: DPA3070-20170308135346.pdf

Form

User ID:	mark	**Name:**	Mark Smotherman
Date:	03/13/2017	**Number:**	30256

000148

Chair, Department Curriculum Committee — Date: 3/13/17

Department Chair (for E. Kraemer) — Date: 3/13/17

Chair, College Curriculum Committee: Christopher Kitchens — Date: 3/17/2017

College Dean: Bradley Putman — Date: 3/18/17

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date: 4/7/2017

Chair, Graduate Curriculum Committee — Date

Provost: Robert A. Jones — Date: 8/24/17

President — Date